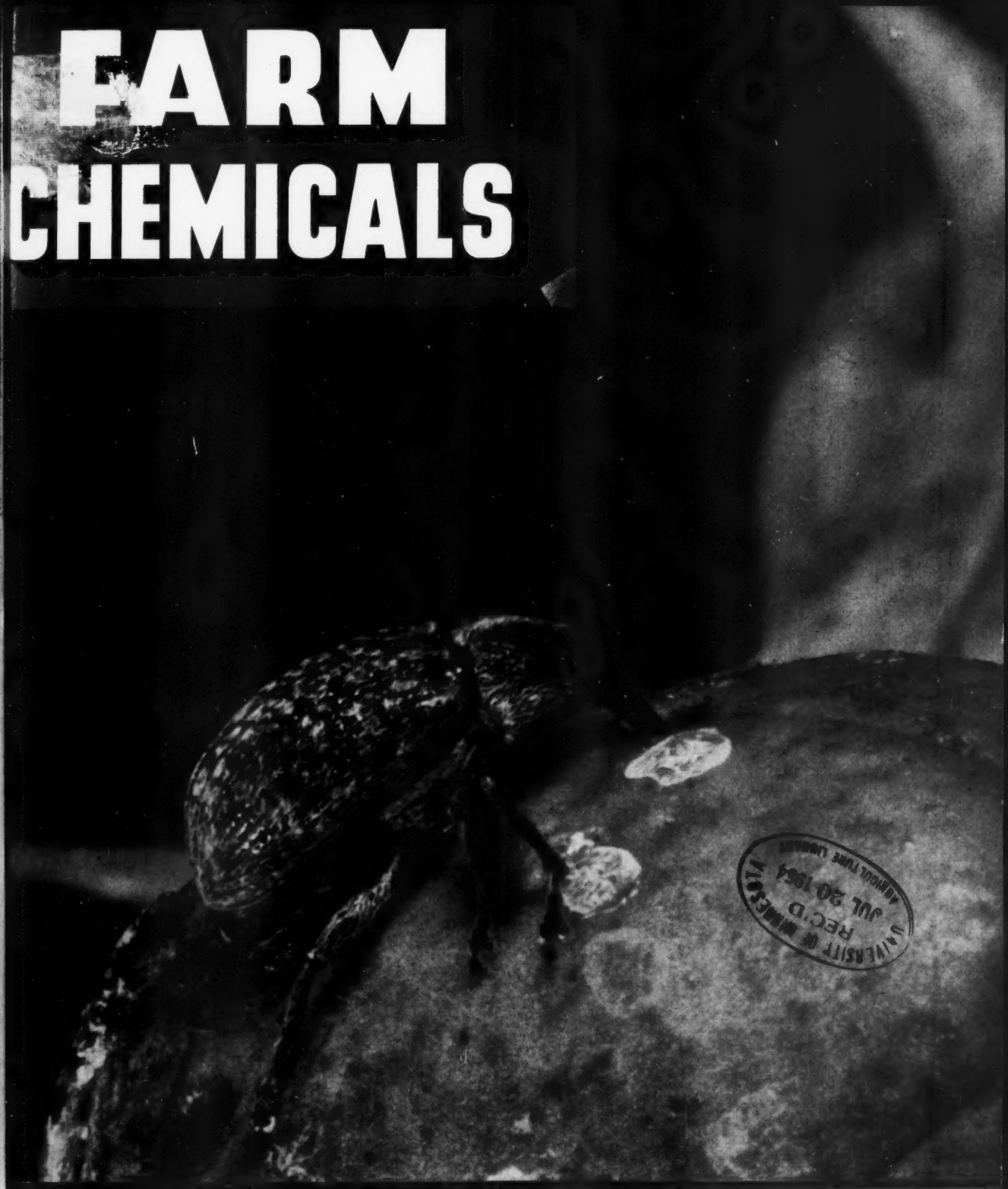
FARM CHEMICALS



AGRICULTURAL CHEMICALS • *SULPHATE of AMMONIA* • *ORGANIC AMMONIATES* • *SULPHUR*

VEGETABLE OIL MEALS AND FEEDSTUFFS

ALL FERTILIZER MATERIALS

Foreign and Domestic

EXCLUSIVE DISTRIBUTORS DUVAL SULPHUR AND POTASH COMPANY

Branches
...E, Va. Charleston, S. C.
..., Miss. Tampa, Fla.
Columbus, Ohio

ASHCRAFT-WILKINSON CO.

Home Office Atlanta, Georgia Cable Address Ashcraft

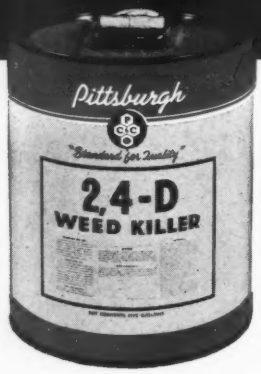
Subsidiaries
Interstate Mills, Inc., Cairo, Ill.
Interstate Warehouse, Cairo, Ill

UNIVERSITY OF MINNESOTA
REC'D
JUL 20 1954
AGRICULTURE LIBRARY

Sell Pittsburgh 2,4-D WEED KILLERS

and you'll Sell More in '54!

FIELD-TESTED CHEMICALS
BACKED BY
AGGRESSIVE PROMOTION



Good 2,4-D sales! They can often brighten your entire farm chemical profit picture! That's why it will pay you to carry a good stock of *Pittsburgh* 2,4-D Weed Killers right through 1954. When you handle *Pittsburgh* 2,4-D, you have a solid, hard-working sales program backing you up every step of the way: (1) Quality-controlled chemicals and fast dependable deliveries because we're a *basic* producer. (2) Assured weed-killing performance in your customers' crops because *Pittsburgh* 2,4-D is *field-tested right in your area.* (3) A complete advertising program to promote your sales—including farm paper ads, literature, window streamers and newspaper mats. The result? Sell *Pittsburgh* 2,4-D and you're sure to "Sell More in '54!" Send for complete details now!

W&D 5030

Standard for Quality

ORGANIC INSECTICIDES: Benzene Hexachloride, Toxaphene, and DDT.

ORGANIC PHOSPHATE INSECTICIDES: Parathion Wettable Powders, Parathion Liquid Concentrate, Systox.

WEED KILLERS: 2,4-D Acid, 2,4-D Amine Concentrates, 2,4-D Ester Formulated Concentrates, D4 (Low Volatile 2,4-D Ester), C4 Pre-Emergence Weed Killer, 2,4,5-T Formulations.

AGRICULTURAL CHEMICALS DIVISION

PITTSBURGH
COKE & CHEMICAL CO.

Grant Building • Pittsburgh 19, Pa.

COAL CHEMICALS • AGRICULTURAL CHEMICALS • FINE CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

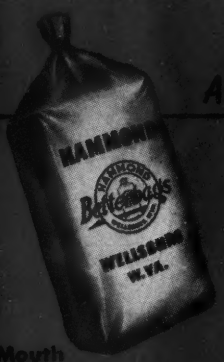
103276

ALWAYS SPECIFY → HAMMOND

MULTI-WALL BAGS

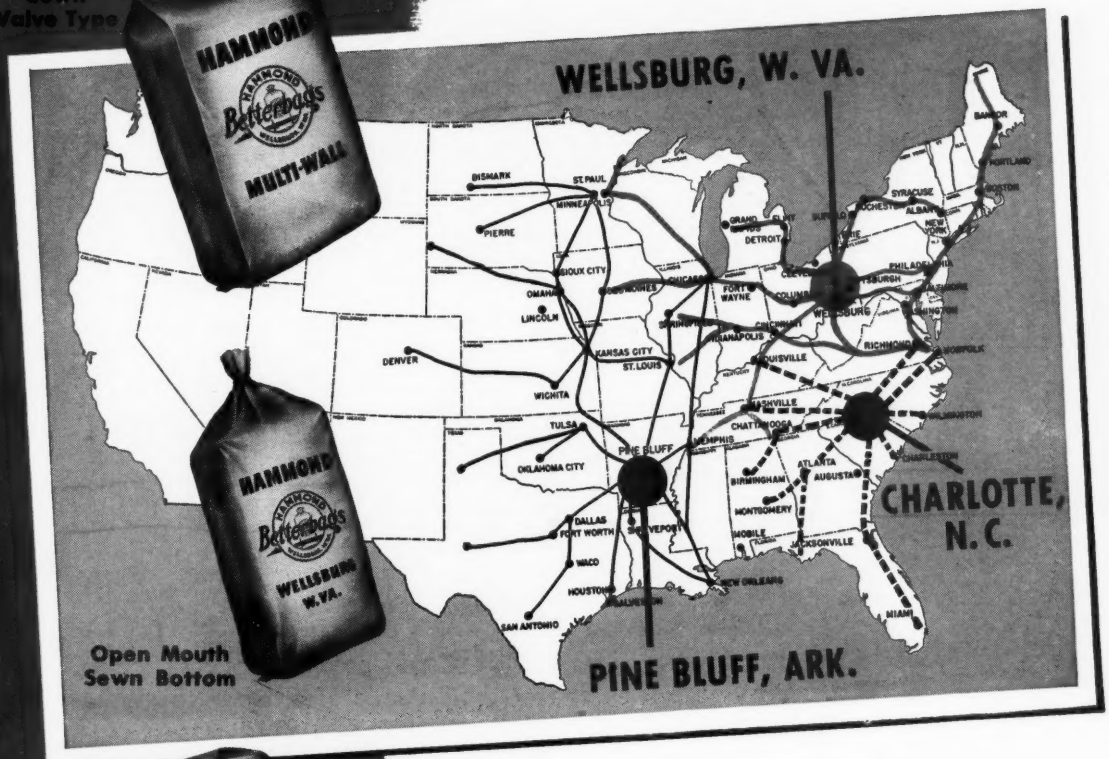
FOR PROMPT SERVICE FROM

THREE STRATEGICALLY LOCATED PLANTS



Open Mouth Pasted Bottom

Sewn Valve Type



Open Mouth Sewn Bottom

Pasted Valve Type

We have now moved into our new modern factory at Charlotte, North Carolina—another step in our program of constantly improving service to our customers.

Hammond "personalized service" is more than a slogan. Call our nearest representative.

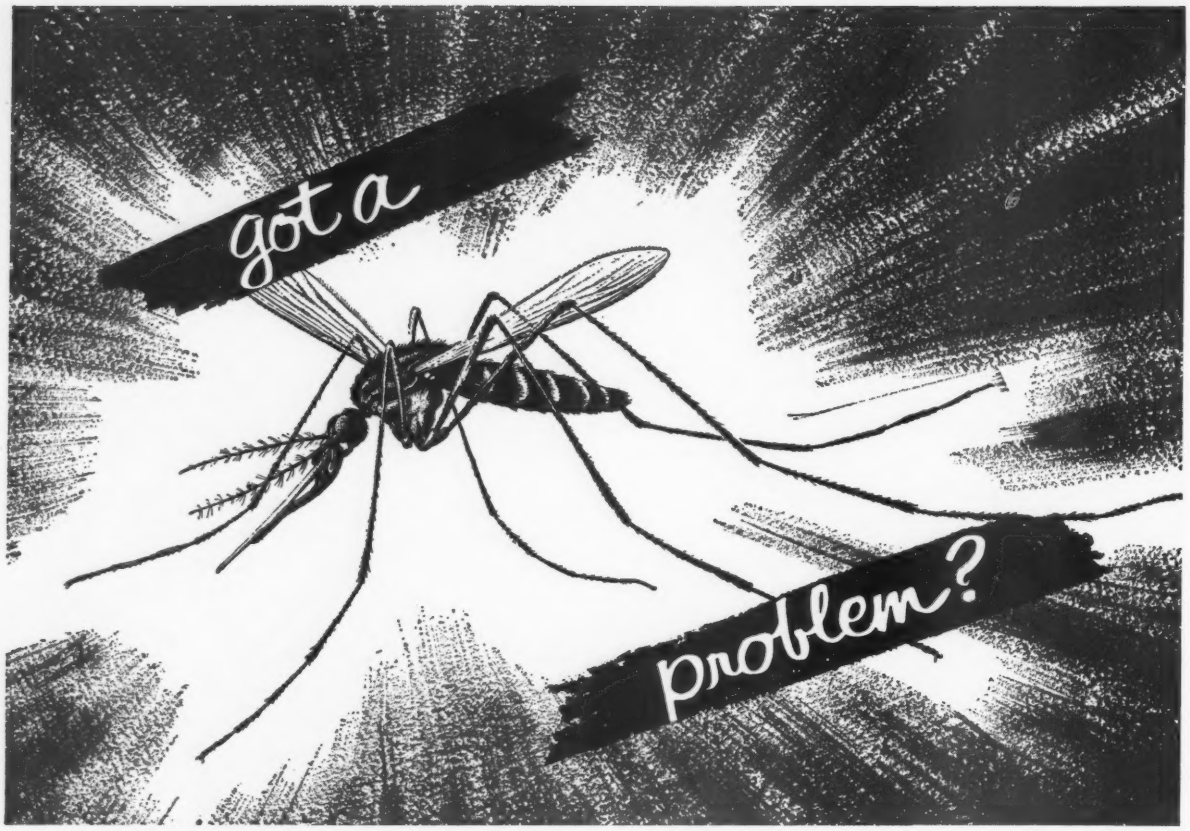
Representatives in the following cities:

KANSAS CITY, MO.	ATLANTA, GA.
NEW YORK, N.Y.	BLUEFIELD, VA.
DALLAS, TEXAS	CHICAGO, ILL.
LIGONIER, PA.	AKRON, OHIO
MINNEAPOLIS, MINN.	CHARLOTTE, N.C.
WASHINGTON, D.C.	BIRMINGHAM, ALA.

HAMMOND Betterbags

HAMMOND BAG & PAPER CO.

General Offices: Wellsburg, W.Va.
Plants in Wellsburg, W.Va., Pine Bluff, Ark., and Charlotte, N.C.



use dieldrin

(Say "deel-drin")

Dieldrin in small doses gives effective mosquito control. It is also one of the most efficient controls for adult houseflies, salt marsh sand fly larvae, ticks, chiggers and fleas.

Dieldrin treatments remain effective for long periods. *One* application controls these public health pests for several weeks in exposed areas . . . for several months in protected areas.

Dieldrin has been proved by such experienced users as Pest Control Operators, Public Health Organizations and Mosquito Abatement Crews.

Technical literature on formulation and application of dieldrin will be sent to responsible parties on request.

• • •

Technical dieldrin is supplied by Shell Chemical Corporation, and well-known insecticide manufacturers sell it under their own brand names.

SHELL CHEMICAL CORPORATION

AGRICULTURAL CHEMICALS DIVISION
P. O. Box 1617, Denver 1, Colorado

Atlanta • Houston • New York • San Francisco • St. Louis • Jackson, Mississippi

Farm Chemicals

Pioneer Journal of the Farm Chemicals Industry – Established 1894

Published Monthly by WARE BROS. COMPANY
317 North Broad Street, Philadelphia 7, Pa.
Telephone MArket 7-3405

A magazine national in scope and circulation and devoted to manufacturers, mixers, and formulators of fertilizers and pesticides

Staff
Sam Lewis Veitch.....Publisher
A. A. Ware.....Editor
Geo. P. Teel, Jr.....Managing Editor
Phyllis L. Gerhart.....Editorial Assistant
Helen M. Hausman.....Circulation Manager
K. F. Ware.....Advertising Manager

Advertising Representatives
Harold H. Short, Jr.
51 E. 42nd St., New York 17, N. Y...MUrray Hill 7-6669
Al Zilenziger
333 N. Michigan Ave., Chicago 1, Ill....FRanklin 2-7100
William Blair Smith
Russ Building, San Francisco 4, Cal....EXbrook 2-3723
Hughlett Hollyday Jr.
505 S. Alandele Ave., Los Angeles 36, Cal. WEbster 8-1201

BPA
Member Business Publications Audit

Subscription Rates
U. S., its possessions, Canada Cuba and Panama per year.....$6.00
Mexico and other foreign..... 7.50
Single Copy..... .50
Back Numbers..... 1.00
Acceptance under Section 34.64 P. L. & R., authorized.

Cover Story

Louisiana field trials by USDA entomologists have shown that use of insecticides to control cotton pests such as the bollworm pictured adds up to about a fourth larger crop on the average.

photo by Bob Taylor

Vol. 117 JULY, 1954 No. 7

Contents

Industry News..... 4
People..... 7
Company Briefs..... 10
Associations and Meetings..... 11
Equipment and Supplies..... 14
Washington Letter..... 16
Bailey and Harms
APFC Convention..... 21
NFA Convention..... 27
Controlling the June Beetle Grub..... 32
James R. Dogger
CSMA Meet Features Aerosol Survey..... 33
Cyclethrin—New Insecticide..... 35
Rutgers Institute Dedication..... 35
Vermiculite-Carried Chelates..... 36
Naugatuck's 50th Year..... 36
TVA Continuous Ammoniator for Superphosphates & Fertilizer Mixtures..... 38
Yates, Nielsson and Hicks
Cotton Diseases in the West..... 49
Philip J. Leyendecker
Salisbury Coop Plant Triples Fert Output 52
Dick Brown
The Future of Chemicals in Cotton..... 55
W. B. Ennis, Jr.
Pest Reports..... 58
Production..... 60
Market Reports..... 61
Editorial—New Ideas Through Atomic Energy..... 64
Reader Service..... 65
Buyers' Guide..... 67

In this issue . . .

The weather was near perfect, the programs were excellent and it was evident that a good time was had by all those attending the June fertilizer conventions. See page 21 for coverage of APFC activities and page 27 for highlights of the NFA meeting.

The first of several short features, a special article on the damaging green June beetle grub, by James R. Dogger, is on page 32.

Other articles in this section include news of iron chelates on a vermiculite carrier; some coverage of the recent CSMA meeting (more in next issue); preliminary data on cyclethrin, the new Carbide and Carbon Chem. insecticide; dedication of Rutgers' Institute of Microbiology and announcement of Naugatuck Chemical's 50th birthday.

Of special interest to fertilizer producers will be the first half of a paper on the TVA Continuous Ammoniator, by Yates, Nielsson and Hicks. This was presented before the American Institute of Chemical Engineers. It begins on page 38 and will be concluded in the August issue.

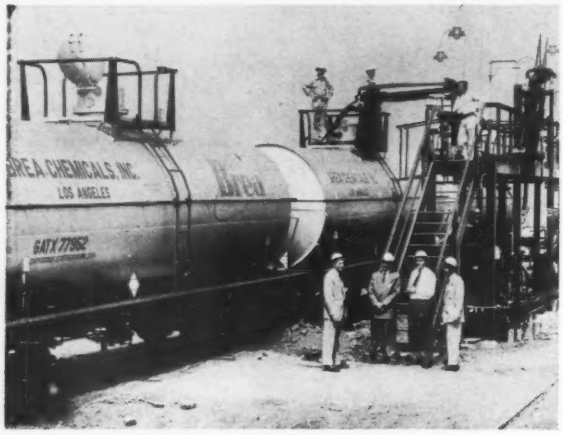
This year disease will wipe out cotton production in the five western growing states equivalent to 360,000 acres, says P. J. Leyendecker. Beginning on page 49, he reviews the cotton disease problems currently facing Western cotton growers.

A new materials handling system at the Salisbury, N. C. plant of Cooperative Fert. Service has resulted in tripled production. See pages 52 and 53 for information and pictures.

A very complete review of the use of herbicides in weed control is provided by W. B. Ennis, Jr., in his paper on page 55. Emphasized are current practices and fields of research.

INDUSTRY News

Brea and Lion Plants Ship First NH3



R. S. Ogilvie, plant superintendent; R. S. Ray, manager of manufacturing; T. C. Henderson, operations superintendent and Jack Tielrooy, manager of development for Brea Chemicals with members of the loading crew.

G. G. Hayes, vice pres., traffic, Texas & Pacific Railway Co.; G. G. Scott, Lion's New Orleans district chem. sales manager; R. L. VanZandt, Barton plant superintendent and J. G. Rogerson, Lion mgr. of manufacturing.

New plants of both Brea Chemicals, Inc. and Lion Oil Co. made their first shipments of anhydrous ammonia in May.

Brea's plant, located in Brea, Cal., and Lion's Barton plant, located near New Orleans, were expected to be in full operation in June.

Ammonia from the California unit is converted to Brea Aqua Ammonia for tank ship or barge delivery to seven Brea storage terminals. Five other terminals receive the product as ammonia and convert it to a nitrogen fertilizer solution, aqua ammonia, for delivery to local growers.

When all facilities of Lion's Barton plant are in full production, shipments of anhydrous ammonia and pelleted ammonium nitrate are expected to average about 600 tons per day throughout the year. By-product carbon dioxide will be utilized for production of about 42 tons daily of dry ice and liquid carbon dioxide. Nitric acid, an intermediate chemical in ammonium nitrate manufacture, will be produced in a unit with capacity for 430 tons of acid a day. The first tank car of anhydrous ammonia from the Barton plant was consigned to Swift & Co.'s Plant Food division.

Miss. Joins Bollworm Work

Mississippi is the latest cotton state to join in cooperative financing of the expanded pink bollworm research program which got underway last year. An appropriation totaling $50,000 for the fiscal years 1954 and 1955 has been made by the state's legislature and signed by Governor Hugh White.

The research program is jointly financed by the Federal government, the Oscar Johnston Foundation and by cotton growing states. Other states besides Mississippi which have joined the program are Georgia, Texas, Alabama and Arkansas.

Davison Officials Continue Under Grace Ownership

Following the merger of The Davison Chemical Corp. with W. R. Grace & Co., approved by stock holders of both companies in May, the present board of directors are continuing as members of an advisory board of the Davison division, and present officers of the company are continuing in corresponding posts of the new division of Grace.

Officers: Chester F. Hockley, chairman of the advisory board; M. G. Geiger, vice-chairman of the advisory board and president; P. W. Bachman, vice president; D. N. Hauseman, vice president; W. B. McCloskey, vice president; M. C. Roop, vice president and secretary; C. E. Waring, vice president; W. N. Watmough, Jr., vice president; J. S. Marks, treasurer; F. J. Griffin, controller; F. Z. Oles, assistant controller and R. S. Clark, assistant secretary.

It is expected that sometime after the merger the Grace management will recommend that the board of directors of W. R. Grace & Co. be increased and that C. F. Hockley and M. G. Geiger will be invited to become members of such enlarged board of directors.

Nitrogen Div. Completes Omaha Ammonia Plant

Completion of the ammonia production facilities at its new Omaha, Neb., nitrogen plant, estimated to cost $25 million when completed, has been announced by Allied Chemical & Dye Corp. Urea production facilities are expected to be completed soon.

Officials of Allied Chemical's Nitrogen division and of Catalytic Construction Co. and The Girdler Co., two principal construction contractors on the Omaha project, attended the Public Affairs Luncheon given by the Omaha Chamber of Commerce on May 19 to celebrate the beginning of ammonia shipments from the plant.

Hugo Riemer, Nitrogen division president, said that the new plant was the first of its kind in the great North Central agricultural area and that "we like to think of it as only a beginning."

V-C Buys Kentucky Plant

Virginia-Carolina Chemical Corp. has purchased the fertilizer plant of Cumberland Chemical Co. at Hopkinsville, Ky., according to an announcement by C. Cecil Arledge, vice president of V-C.

Operation of the Hopkinsville plant by V-C is scheduled to begin on July 1. The company owns and operates 37 fertilizer plants.

Nitrogen Solutions Tested In Ky. Demonstration

A demonstration of the various methods of applying nitrogen solutions was conducted recently by Bluegrass Nitrogen Co. and Nitrogen division, Allied Chemical & Dye Corp., on the Herschel Weil farm near Lexington, Ky., with about 1,000 persons in attendance.

Equipment used in the adding of nitrogen solutions to irrigated water was demonstrated by two firms; solution application by airplane was shown; varicus types of storage tanks were displayed and the proper way to unload a tank car of nitrogen solution was also shown.

This was part of a two-day Nitrogen Solution conference and field day sponsored by Nitrogen division. The conference portion of the program, held the day prior to the field day demonstrations, took place at the University of Kentucky in Lexington.

Response to the event was said to be highly favorable. Other dealers have announced plans to conduct application demonstrations in their areas. Many speakers were asked to repeat their talks to other groups with one asked to address 20 different organizations.

Floridin Moves Head Offices to Tallahassee

New executive and administrative offices have been established by Floridin Co. at Tallahassee, Fla. For the past 43 years, the company has maintained headquarters at Warren, Pa., and a branch office now will be located there.

Besides the modern, air conditioned office structure, Floridin also is constructing a research and development laboratory at Tallahassee. Considerable expansion of research activities in the development of new adsorbents and new uses for current products is planned.

The move of administration offices and research and development laboratory is designed for closer coordination between all branches of the company.

New N. C. Fert. Grades

Six new grades were added to the North Carolina official fertilizer grade list and one was deleted, making a total of 33 approved grades.

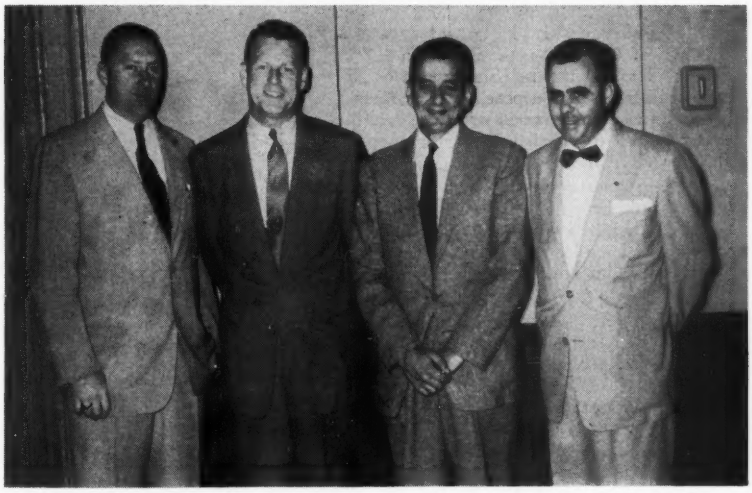
Additional ones adopted for the crop year beginning July 1 are 6-12-15 for tobacco; 4-8-12, 4-12-12 and 6-12-6 for general crops and 10-20-10 and 15-30-15 designated as experimental grades.

Insecticide Rules Revised

A revision of household insecticide (liquid spray type) Commercial Standard CS72-38 has been circulated to the industry for written acceptance, according to the Commodity Standards division, Department of Commerce.

The title is changed in the revision to household insecticide (liquid space spray type for flying insects) to distinguish the product from those for other crawling insects.

Safety Section Heads At Capital Meet



NSC's Fertilizer section Three-Year Planning committee: T. J. Clarke, G.L.F. Soil Building Service; F. W. High, Baugh Chemical Co.; John E. Smith, Spencer Chem. Co. and C. A. Cox, Virginia-Carolina Chem. Corp.

Eight members of the National Safety Council's Fertilizer section Executive committee attended the President's Occupational Safety conference in Washington on May 4, 5 and 6.

The representatives, John E. Smith, Thomas J. Clarke, Curtis A. Cox, Vernon S. Gornto, C. J. Watts, Jr., John Mark, Charles W. Best and William C. Richardson, held several meetings while in Washington to discuss work under way and future objectives of the Fertilizer section.

Two lengthy meetings were held by members of the "Three Year Planning committee" Smith, Clarke and Cox, recently appointed by General Chairman Gornto, to study the many proposals for objectives to be incorporated in the three year plan.

Meeting with the planning group were Russell Coleman, National Fertilizer Association president, and Louis Wilson, director of information for American Plant Food Council.

Gornto stated he felt confident the committee would present a very practical and comprehensive report, which would be in effect a blueprint of all the major activities which the Fertilizer section plans to undertake during the next three years.

Novel N Division Ad Mats Distributed

Nitrogen division, Allied Chemical & Dye Corp.'s new Adver-Mat, which will be distributed to Arcadian 12-12-12 retail stores in the Midwest. Another mat, advertising Arcadian Nitrate of Soda and Arcadian A-N-L, is being distributed in the South. Principal advantage of Adver-Mats is that the message reaches the customer before he sees competitors' advertising in the store itself. Because of its location, the mat is seen by everyone entering the store. Response has been said to be highly favorable.

Survey Shows Firm Cotton Belt Farm Chem. Sales

A beltwide survey, which indicates how a reduction of 6,135,000 acres in cotton in 1954 will affect the manufacture of farm machinery, equipment and farm chemicals and what crops will be planted on acres lost to cotton, has been issued by the COTTON TRADE JOURNAL.

While the pattern varies from one area to another, well over half of the farmers queried indicated they will either maintain or increase their dollar volume purchase in the farm chemicals field.

Almost half said they will buy as much farm machinery in 1954 as they did last year, but only a few indicated they will purchase more machinery. A significant part of the reduction in purchases of these commodities can be ascribed to lower cash income of farmers last year than in 1952, the survey showed.

Results of the survey, conducted of a cross section of the journal's subscribers, show that on a Beltwide basis, small grains, corn and soybeans will be the chief crops to be planted on acres lost to cotton. It was noted, however, that 13⅓ per cent of the acres will be allowed to lie fallow.

Reduce Kansas Fert. Fee

The Kansas fertilizer inspection fee was reduced from 20 to 15 cents per ton, effective July 1, on all fertilizer subject to the provisions of the state fertilizer law.

It is the policy of the department to reduce the fees when more monies are being collected than is necessary for the administration of the act, reported John L. Monagham, director, Control division of Kansas State Board of Agriculture. He emphasized that the reduced fee is not effective until after July 1, so that firms computing the fee due on shipments made for the first six months of 1954 should use the 20 cent figure.

Texas Company Sold

Chemical Enterprises, Inc. last month announced the addition of Gulf Liquid Fertilizer Co., an NH_3 distributor of Wharton, Tex., to its companies in the farm chemical distribution field.

Gulf operates through 30 stations in Texas. It will continue to operate as an independent unit under the same policy as in the past with J. K. Derden continuing as vice president and general manager.

Extensive additions to its present 30 distribution stations are planned by Chemical Enterprises, as well as installation of new distribution facilities at about 20 new sites which have been selected and partially developed.

C-I-L Plant Wins Safety Award

Mayor R. A. Donahue of Halifax, N. S. (left) presents the National Safety Council's Certificate of Commendation to John Cree, work's foreman of C-I-L's Halifax fertilizer plant. A. B. Tolmie, works mgr., in center.

A record of almost 11 years without a lost-time accident was set by employees of the Halifax fertilizer plant of Canadian Industries, Ltd., according to an announcement by A. B. Tolmie, works manager, at a safety dinner in the Lord Nelson Hotel, Halifax, Nova Scotia, on May 28.

A certificate of achievement was presented to John Cree, foreman, on behalf of the National Safety Council by R. A. Donahoe, mayor of Halifax. The plant also won its second C-I-L prize, highest award under the company's no-accident record plan and represents 612,800 accident-free manhours.

Interstate Tax Reports

Both general business corporations and the states themselves suffer from the present "diverse and inconsistent" state tax rules for apportioning net income of general business corporations in interstate commerce, according to a research report issued by Controllership Foundation, Inc.

Based on an analysis of tax laws, regulations and administrative rulings as they affect actual industrial and mercantile corporations which are in interstate commerce, the report analyzes and compares the methods followed by 32 states which tax net income of out-of-state companies doing business within their borders.

Actual research for the Foundation project was done by the Bureau of Business Research of the School of Business Administration, University of Michigan. Copies of the report are available at the offices of the foundation, One East 42nd Street, New York City. They are priced at $1 to Controllers Institute of America members, $1.50 to all others.

STEDMAN

FERTILIZER PLANT EQUIPMENT

All Steel Self-Contained Fertilizer Mixing and Bagging Units

Batch Mixers — Dry Batching
Pan Mixers — Wet Mixing
Tailings Pulverizers - Swing Hammer and Cage Type
Acid Weigh Scales
Vibrating Screens
Belt Conveyors — Stationary and Shuttle Types
Dust Weigh Hoppers
Batching Hoppers
Bucket Elevators
Hoppers and Chutes

STEDMAN FOUNDRY & MACHINE COMPANY, INC.
Subsidiary of United Engineering and Foundry Company
General Office & Works: AURORA, INDIANA . . . Founded 1834

Wisconsin's Emil Truog Retired This Month

Professor Emil Truog, chairman of the Soils department, University of Wisconsin, retired from active duties on July 1, after nearly 50 years at the University.

Many of his friends and former students attended a Testimonial Dinner held in his honor on June 3 in the Great Hall in Madison. Dr. Russell Coleman, National Fertilizer Association president; Oscar Rennebohm, vice president of the Regents and former governor of Wisconsin and Dean Kivlin, college of agriculture, delivered addresses at the dinner.

Letters received by Dr. Truog commenting upon his retirement were bound and presented to him along with a portrait at the dinner. The Emil Truog Honorary Recognition committee also invited persons to contribute to a fund to be presented to the Soil Science Society of America in the name of Dr. Truog. This fund is to be administered by the Society and income from it to be used as an annual Emil Truog Award for an outstanding soil scientist. A check for the total amount received toward this fund was to be presented to the Soil Science Society in Professor Truog's name at the dinner.

New Camicide Insecticide

Camicide, a new non-toxic and odorless insect spray, has three to eight times more insect-kill than ordinary insecticides, yet can be used with complete safety, according to Campbell Chemicals, Inc., which developed the spray. Two concentrates for farm use are available:

Camicide No. 15 Pyrenone, for use around grain processing equipment, in storage areas and in packing areas; and Camicide Dairy Cattle Spray Concentrate.

DuPont Seed Disinfectants

Two new liquid seed disinfectant formulations, Liquid 364 and Liquid 244, have been announced by the Du Pont Co. Based on a combination of phenyl mercury acetate and ethyl mercury acetate, they are for use on small grains (wheat, rye, barley, oats and flax).

Du Pont Liquid 364 is a concentrate to be diluted with water for use in slurry treaters, while Du Pont Liquid 244 is for use undiluted in ready-mix (fully automatic) treaters. Both are sold in drums of five and 30 gallons, and Liquid 244 is also available in 50-gallon drums.

Second O'Hara Bill

A second bill for controlling the use of chemicals in foods has been introduced into the House by Rep. Joseph O'Hara of Minnesota. It differs from H. R. 8418, his first proposal, by giving the Secretary of Health, Education and Welfare broader powers to limit the use of chemical additives.

A portion of H.R. 9166, the new measure, which relates to the secretary's action on application made by industry to use new chemicals in foods, follows:

"The secretary shall, in determining whether the proposed ingredient is a poisonous or deleterious substance for its intended use, consider among other relevant factors:

"1). The functional value of the proposed additive for its intended use.

"2). The probable consumption of the new chemical additive and any food in which it is intended to be used as a component.

"3). The cumulative effect in the diet of the same or any chemically or pharmacologically related substance or substances.

"4). Appropriate safety factors for transposing animal experimentation data to practical use in appraising the hazard to man."

These additional considerations were described by spokesmen of the industry as unnecessary for proper protection of the public and merely additional impediments to the chemical industry in marketing its products in the food industry.

People

Dr. Niven D. Morgan, Southwest representative for **American Potash Institute** has been honored with the award of Master Agronomist by Oklahoma A & M College, for outstanding achievement in the field of agronomy. This is the first year the award has been extended to men in the commercial field who have worked to improve the agricultural program of the state.

Arkell and Smiths has appointed Tom L. Jones manager of fertilizer bag sales. He will continue in his present capacity as Central division sales manager with offices at Columbus, O.

Preston W. Parvis has been elected secretary of **Atlas Powder Co.,** succeeding Harry B. Hygate, who has retired after 41 years of service.

Miss Gretchen D. Little of **Atlas Powder Co.,** recently was installed as president of the Special Libraries Association at the group's annual business meeting in Cincinnati, O.

Columbia-Southern Chemical Corp.'s Philadelphia district sales manager, Paul A. Fodor, Jr., has been awarded a "Certificate of Service" by the Department of Commerce for his contribution to the nation's Industrial Mobilization Program. Fodor had served as chief of the Inorganic and Agricultural branch, Chemical division, National Production Authority, during the past 12 months while on leave from the firm.

Paul A. Fodor, Jr.

Election of T. S. Carswell as a director of **Commercial Solvents Corp.** was announced last month by J. A. Woods, president. Carswell, who is vice president in charge of the Biochemicals division, joined Commercial Solvents in 1946 after 30 years' experience in the chemical industry. Until January of this year, when he assumed his present duties, he had been vice president in charge of the Research and Development department.

T. S. Carswell

New director of the Tobacco division, **Commodity Stabilization Service,** USDA, is Clarence L. Miller. J. E. Thigpen, former director, is transferring to the CSS Oils and Peanut division as director of that division.

Died: Ward Delaney, 59, executive director of the Oscar Johnston Cotton Foundation, from a heart attack in Charlottesville, Va. on May 23.

Dryomatic Corp. has announced the election of Walter W. Bolton as president, succeeding W. B. Heinz, who will continue to serve on the board of directors.

Edward F. Sterk, assistant to the agricultural chemicals sales manager of **DuPont Co.'s** Grasselli Chemicals department, has retired after nearly 45 years with the department and its predecessor, Grasselli Chemical Co. He joined Grasselli Co. in 1909 as a stenographer, was promoted to salesman and then to eastern sales manager for agricultural chemicals. A year after the company became the Grasselli Chemicals department, Sterk moved to Wilmington as assistant to the manager of agricultural sales.

Edward F. Sterk

Dr. Arne E. Carlson has been appointed manager of agricultural chemicals sales for **DuPont Co.'s** Grasselli Chemicals department, succeeding George A. Wright, who has been named Grasselli's New York district sales manager.

Died: Waldo C. Bailey, 81, former Western district superintendent of Grasselli Chemicals department, **DuPont Co.,** at his home in Shaker Heights, O., after a month's illness.

A member of **DuPont Co.'s** Legal department, Francis J. Zugehoer, was appointed assistant director of the department and assistant general counsel of the company, succeeding Charles A. Rittenhouse, III, who was recently named director.

Phillips supplies NITROGEN in 4 forms

1 AMMONIUM SULFATE

New Premium Quality Phillips *66* Ammonium Sulfate is available *now!* It's *dry*-cured to remove excess moisture—prevent caking. Uniform, dust-free crystals flow freely—mix easily. Contains 21% nitrogen, ideal for all analyses of mixed goods and for direct application to all farm crops. Contact us now for your requirements.

2 ANHYDROUS AMMONIA

Tank car shipments of Anhydrous Ammonia (82% nitrogen) are assured to Phillips contract customers by Phillips huge production facilities in the Texas Panhandle and at Adams Terminal near Houston. Write our nearest Division Office for full information.

3 NITROGEN SOLUTIONS

Get more N per dollar! Phillips *66* Nitrogen Solutions are well suited to the preparation of high-analysis fertilizers and the ammoniation of superphosphate. These three nitrogen solutions keep handling costs low! Promote rapid, thorough curing!

4 AMMONIUM NITRATE

Phillips *66* Prilled Ammonium Nitrate contains 33% nitrogen. The small, coated prills or pellets resist caking . . . handle easily. Depend on Phillips *66* Prilled Ammonium Nitrate for uniform, free-flowing properties and top-notch crop response.

PHILLIPS CHEMICAL COMPANY

A Subsidiary of Phillips Petroleum Company, Bartlesville, Oklahoma.

Offices in:

AMARILLO, TEX.—*First Nat'l Bank Bldg.*
BARTLESVILLE, OKLA.—*Adams Bldg.*
CHICAGO, ILL.—*7 South Dearborn St.*
DENVER, COLO.—*1375 Kearney Ave.*
DES MOINES, IOWA—*606 Hubbell Bldg.*
HOUSTON, TEX.—*1020 E. Holcombe Blvd.*
INDIANAPOLIS, IND.—*1112 N. Pennsylvania St.*
KANSAS CITY, MO.—*500 West 39th St.*
MINNEAPOLIS, MINN.—*212 Sixth St. South*
NEW YORK, N. Y.—*80 Broadway*
OMAHA, NEB.—*WOW Building*
PASADENA, CALIF.—*604 Citizens Bank Bldg.*
SALT LAKE CITY, UTAH—*68 South Main*
SPOKANE, WASH.—*E. 521 Sprague Ave.*
ST. LOUIS, MO.—*4251 Lindell Blvd.*
TAMPA, FLA.—*1506 South Dale Mabry*
TULSA, OKLA.—*1708 Utica Square*
WICHITA, KAN.—*501 KFH Building*

Recently appointed vice president and technical director of the Chemical divisions, **Food Machinery & Chemical Corp.** is Carl F. Prutton. Dr. Prutton has been head of the Department of Chemistry and Chemical Engineering at Case Institute of Technology; chief, Process Development branch, Office of Rubber director; director of research, vice president and director of operations, engineering and research, Mathieson Chemical Corp.

Fulton Bag & Cotton Mills has named William P. Gatts resident sales representative for Salt Lake City. He will represent Fulton in Utah and Idaho. Concurrently, the company announced the resignation of Horace Smith, of Rupert, Ida., from its sales organization.

Special sales representative for **Hammond Bag Co.** in the Chicago area is William A. Sheets. Harold S. McCormick, Jr. has also joined the company. He will be attached to the General Sales department at Wellsburg, W. Va., as special representative.

International Paper Co. administrative changes: John H. Hinman has been elected to the newly-created position of chairman of the board; Richard C. Doane succeeds him as president; F. Henry Savage has been named vice president and general sales manager, succeeding Doane; Joseph P. Monge has been elected treasurer; Stuart E. Kay, who was appointed vice president in charge of operation for the company's northern mills in 1951 has also been assigned the direction of the company's labor and employee relations and Olaf N. Rye was named general traffic manager.

George M. Walker, vice president and general manager, Chemical division, **Koppers Co., Inc.,** has been elected to the board of directors of the Manufacturing Chemists' Association, filling the unexpired term of the late Dan M. Rugg, also of Koppers.

New Chicago district sales manager for **Mallinckrodt Chemical Works,** E. Richard Kuehne, will be in charge of sales activities in Chicago and surrounding communities, Milwaukee and Madison, Wisc. and the state of Iowa.

Frank T. Hibbeln was named works manager of **New Idea division,** Avco Mfg. Corp., plants in Coldwater, O., Fort Dodge, Ia.; Sandwich, Ill. and Collegeville, Pa.; Earl I. BeMent was appointed director of industrial engineering and Paul C. Russell was named director of industrial relations.

Onyx Oil & Chemical Co. has appointed Emery I. Valko director of research. Well known for his work in surfactants, germicides and allied chemical fields, he has been project leader at Brooklyn Poly and an independent research consultant in the textile field.

Cameron Siddall is new manager of the Southern division for Agricultural Chemicals, **Pennsylvania Salt Manufacturing Co. of Washington.** The former West Coast agricultural chemicals sales manager will be located at the company's Bryan, Tex., headquarters.

Cameron Siddall

All of the agricultural chemicals sales manufacturing and distributing activities of Pennsylvania Salt Manufacturing Co., the parent company located in Philadelphia, Pa., were transferred to the Washington firm in December of 1953.

Pennsalt of Washington also announced the appointment of Arthur F. Bixby as assistant manager of agricultural chemicals. He will be located in Tacoma, Wash., where he will assist E. H. Karr, manager of the Agricultural Chemicals division.

Manager of personnel relations for **Pittsburgh Coke & Chemical Co.** is Russell W. Davis, former director of industrial relations at Pittsburgh Screw & Bolt Co.

Herschel E. Post has been appointed general manager of the Pacific Coast Paint division of **Pittsburgh Plate Glass Co.**

Equipment Sales Corp. is now sales representative for The Fielden Instrument division of **Robertshaw-Fulton Controls Co.** in the Eastern Tennessee area.

Fielden Instrument division, **Robertshaw-Fulton Controls Co.** has appointed Lawrence C. Connolly manager of its Boston sales office and Donald Daily and William H. Johnson to its sales staff.

Died: Mrs. E. A. Geoghegan, wife of the vice president of **Southern Cotton Oil Co.** and vice chairman of the board of NFA, on May 1 in New Orleans, La.

D. H. Stassfort has been named technical supervisor for **Swift & Co.'s** Plant Food division at Calumet City, Ill.

Newly appointed assistant to the president of **Stauffer Chemical Co.,** its subsidiaries and associated companies, is William Engs, former manager of manufacturing for American Cyanamid Co.'s Agricultural Chemicals division.

Appointment of M. Dirck Reichard to manager of agricultural sales for the Northeastern territory of **Stauffer Chemical Co.** was recently announced by John H. Kennedy, sales manager, Eastern Agricultural Chemicals division. Reichard, formerly with the Agricultural Chemical division of Shell Chemical Corp., joined Stauffer early in 1953. He will continue to make his headquarters in Stauffer's New York office.

M.Dirck Reichard

CHEMICO PLANTS

are profitable investments

Chemico's services cover every detail in design and construction of sulfuric acid plants, acid concentrators, complete fertilizer plants and P-A Venturi Scrubbers for fluorine fume elimination.

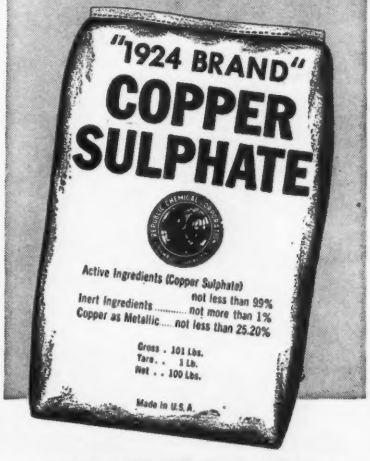
Chemico's performance guarantees are backed up by 40 years of experience. Consultation involves no obligation.

CHEMICAL CONSTRUCTION CORPORATION

488 Madison Ave. New York 22, N. Y.

we manufacture

at Curtis Bay, Maryland


"1924 BRAND"
COPPER SULPHATE
Active Ingredients (Copper Sulphate) not less than 99%
Inert Ingredients ..... not more than 1%
Copper as Metallic.... not less than 25.20%
Gross . 101 Lbs.
Tare . . 1 Lb.
Net . . 100 Lbs.
Made in U.S.A.

REPUBLIC CHEMICAL CORPORATION

94 Beekman St., New York 38, N. Y.
Telephone: REctor 2-9810
Cable Address: Jaynivrad, New York
Established 1924

Retired vice president and director of **Swift & Co.**, N. R Clark, has been appointed a special assistant to Secretary of the Agriculture Ezra Taft Benson. He will assist in making studies of possible methods for disposal of commodities held by the Commodity Credit Corp. in excess of reserve needs.

Wyandotte Chemicals Corp. transfers: Robert J. Polacek named technical assistant to the manager of new products, Organic Chemicals department, Michigan Alkali division; Roy S. Ericson, assistant manager of the Technical Service department, Michigan Alkali division and Royce P. Buck, field representative in the Eastern district office, M.A. division.

Company Briefs

Production of anhydrous ammonia at **American Cyanamid Co.'s** Fortier, La., plant is expected to begin in late October. Capacity of the new facility is expected to be 150 tons per day. American Cyanamid will continue to produce ammonium sulfate at the plant.

Rights to subscribe for 580,235 shares of convertible cumulative preferred stock, series C, 3¾ per cent, $100 par value, were offered to holders of its common stock by **American Cyanamid Co.** Stockholders were entitled to purchase the new issue at a subscription price of $100 per share, at the rate of one share for each 15 shares of common held of record June 1. Transferable warrants expired on June 17.

Prices for Trona Muriate of Potash, for the season June 1, 1954 to May 31, 1955, have been announced by **American Potash & Chemical Corp.** For muriate of potash, 60 per cent K_2O minimum, in bulk, per unit K_2O (f.o.b. Trona, Cal.) prices are 44.5 cents on contracts made prior to July 1, 1954; 49 cents on contracts made July 1, 1954 to Nov. 30, 1954 and 53 cents on contracts made Dec. 1, 1954 through May 31, 1955.

Eight top chemistry, engineering and physics students have been awarded $1,000 **Atlas Powder Co.** senior year college scholarships.

Its 50th anniversary as a manufacturer of high purity chemicals is being celebrated this year by **J. T. Baker Chemical Co.**, Phillipsburg, N. J.

Television advertising will be used by **Bridgeport Brass Co.** to promote its Aer-A-Sol Insecticide, Bug Bomb and Roach and Ant Killer over the summer months. The company has signed with the Mutual Broadcasting System to participate in the sponsorship of five major programs under the network's "multi-message plan."

N. C. Babcock, E. E. Fogle and H. D. Kinsey have been elected vice presidents of **Carbide & Carbon Chemicals Co.**, division of Union Carbide & Carbon Corp. Babcock and Kinsey joined the company in 1924 and Fogle, in 1930.

F. J. Rauscher will head the new Southwestern Sales division formed by **Carbide and Carbon Chemicals Co.** Missouri, Arkansas, Louisiana, Texas, Oklahoma, Kansas, Colorado, Wyoming and Utah will be served by the division. Rauscher, former St. Louis district sales manager, will continue to be located in that city.

Chipman Chemical Co., Inc., of Bound Brook, N. J., has joined the Manufacturing Chemists' Association.

A dividend of 25 cents per share has been declared by **Commercial Solvents Corp.** on its outstanding common stock, payable June 30 to stockholders of record at the close of business on June 4.

Davison Chemical Co., division of W. R. Grace & Co., recently received the annual award of merit from the Associated Member division, Research Institute of America. Its system of "on the spot" photographs to dramatize the company's safety, good housekeeping and cost-control programs won the award for Davison.

A plant at Lompoc, Cal., will be built by **Johns-Manville** to produce its new diatomite products—synthetic silicates for use as inert absorbents, bulking agents or extenders in paints, rubber, etc.

Karr & Co. has announced it is marketing a new production of specially proc-

For more than 50 years Armour fertilizers have been "making every acre do its best". Farmers know that Armour's highest-quality fertilizers are made right and cured right to give best results with all crops.

Every bag of fertilizer sold by Armour is backed by years of painstaking scientific research in the fields of chemistry and farming. Testimonials from every section of the country—on all types of crops—prove that Armour fertilizers make increased yields of better quality crops that bring higher profits.

ARMOUR FERTILIZER WORKS
General Office
P.O. Box 1685
Atlanta 1, Georgia

31 FACTORIES CONVENIENTLY LOCATED TO SERVE YOU

Albany, Ga.
Atlanta, Ga.
Augusta, Ga.
Baltimore, Md.
Bartow, Fla.
Birmingham, Ala.
Carteret, N.J.
Chicago Heights, Ill.
Cincinnati, Ohio
Columbia, S.C.
Columbus, Ga.
Dallas, Texas
E. St. Louis, Mo.
Greensboro, N.C.
Houston, Texas
Jacksonville, Fla.
Jeffersonville, Ind.
Memphis, Tenn.
Montgomery, Ala.
N. Kansas City, Mo.
Nashville, Tenn.
New Orleans, La.
Norfolk, Va.
Presque Isle, Me.
Sandusky, Ohio
Sigio, Tenn.
Waterloo, Iowa
Wilmington, N.C.
Winona, Minn.

Also sales offices in Havana, Cuba, and San Juan, Puerto Rico

essed feather meal containing 15 to 18 units of ammonia.

Consolidated sales offices of **Koppers Co.** in New York City have been moved to the 14th floor of 430 Park Avenue. The company's Chemical, Tar Products, Wood Preserving and Metal Products divisions will occupy the 7,000 square feet of space leased for a 10-year period.

The $880,000 plant of **Lone Star Sulphur Co.**, located at Long Point Dome, Tex., is using a new technique in the Frasch process. Vertical gas-fired heaters will directly heat one million gallons of injection water per day. Daily production of about 400 tons is expected from the plant.

This year the National 4-H Alumni Recognition Award, for which **Mathieson Chemical Corp.** is donor, will again be offered to former 4-H Club members.

First-quarter sales of **Michigan Chemical Corp.** were $948,826, as compared with $1,576,579 for the same period in 1953. The company reported that although first-quarter operations were disappointing, forecasts for the second quarter are more encouraging. Prices and sales volume of insecticides have shown definite signs of strengthening, said President Theodore Marvin.

The Men's Garden Clubs of America last month awarded one of its highest honors to **Monsanto Chemical Co.** for its development of Krilium soil conditioner.

Naugatuck Chemical division of United States Rubber Co. has moved its New York area sales office from 254 Fourth Avenue to the company's offices at 1230 Avenue of the Americas.

Nitrogen division, Allied Chemical & Dye Corp., recently announced a reorganization in agricultural sales at New York. William H. Mortimer, George W. Suggs and Thomas C. Rogers have been made territorial sales managers for agricultural products. Mortimer has charge of agricultural sales in the Western territory and sulfate of ammonia sales; Suggs became sales manager for the Southern territory and Rogers for the Northern territory.

Pennsylvania Salt Manufacturing Co. has more than doubled its capacity for production of anhydrous ferric chloride, according to reports from its Industrial Chemicals division.

A Chemical and Agricultural Sales division has been formed by **Chas. Pfizer & Co.**, to handle world-wide distribution of fine chemicals and pharmaceuticals in bulk and antibiotics for veterinary and feed supplement use. Division manager is John Teeter.

Purchase of the facilities of Pomona Fertilizer Co., Pomona, Cal., has been made by **Plant Food Corp.**, of Los Angeles. Operations at the new branch will be managed by Keith Annis, who has been with Plant Food Corp. for several years. Edward Struve, former Pomona Fert. manager, will act in an advisory capacity.

Commercial quantities of para-tertiary-butylbenzoic acid are now being produced at **Shell Chemical Corp.'s** new plant at Martinez, Cal.

The gas reform and anhydrous ammonia plants, first units of **Sherritt Gorden Mines, Ltd.'s** $24 million nickel refinery at Fort Saskatchewan, Alba., Canada, have been reported to have gone on stream.

Summers Fertilizer Co.'s president, James E. Totman, recently announced the appointment of Dr. C. LeRoy Carpenter as vice president and technical director of Summers and its affiliate, Northern Chemical Industries, Inc.

New address for the main office of **Synthetic Fertilizers & Chemicals, Inc.,** is 511 Fifth Avenue, New York City 17. Telephone Number: MUrray Hill 2-4680.

All packaged sales of sulfuric, muriatic and nitric acid manufactured by Monsanto Chemical Co., previously handled by its Inorganic Chemicals division, will be handled by **Thompson Hayward Chemical Co.** Monsanto will market the acids in tank car and tank wagon quantities only.

The Resin division of **U. S. Industrial Chemicals division,** National Distillers Products Corp., has been purchased by Archer-Daniels-Midland Co., according to a joint announcement by Thomas L. Daniels, ADM president, and John E. Bierwirth, president of National Distillers.

United States Potash Co. has released its price list for agricultural grade Sunshine States Potash for the season June 1, 1954 to May 31, 1955. Prices (f.o.b. Carlsbad, N. M.), based on contracts made prior to July 1, 1954, those made July 1, 1954 to Nov. 30, 1954 and those made Dec. 1, 1954 through May, 1955 are listed respectively:

Higrade muriate of potash (62/63 per cent K_2O) in bulk, per unit of K_2O—36 cents, 39.5 cents and 43 cents.

Granular muriate of potash (59/61 per cent K_2O) in bulk, per unit of K_2O—37 cents, 40.5 cents and 44 cents.

Granular muriate of potash (60 per cent K_2O min.) packed in 100 lb., 5 ply paper bags, per ton of 2,000 lbs.—$26.50, $28.60 and $30.70.

Manure salts, run-of-mine 20 per cent K_2O min. in bulk, per unit of K_2O—17 cents, 19 cents and 21 cents.

Effective June 1, **U. S. Steel Corp.**, under a new pricing policy, was expected to reduce prices of coke oven ammonium sulfate $2 per ton at most shipping points and $3 per ton at Fairfield, Ala. At Lorain, O., price was to remain unchanged.

Organization of a new system of floating "tractor-trailers" for bulk chemical transportation via the Great Lakes has been announced by **Wyandotte Chemicals Corp.** Following a successful test run between Wyandotte, Mich., and Chicago, the company said that it will place three converted iron ore freighters in a shuttle service to Chicago.

Associations & Meetings

CFA Award to Fert.

Essay Contest Winner

Mary Ball, a first year student at Mt. San Antonio Junior College, Pomona, Cal. has been voted the grand award in the California Fertilizer Association's 1954 fertilizer essay contest.

This year's contest was on the subject "More Profit from Greater Use of Fertilizer" and involved research into the economic values to be derived from proper fertilizer usage. Confined to vo-ag students of California junior colleges, the contest is an annual affair judged by members of the CFA Soil Improvement Committee.

Miss Ball, an animal husbandry major, was awarded a $100 check and her school was given custody, for one year, of the handsome perpetual trophy. A runner-up from each other school submitting entries received a $25 award.

PESTICIDE FORMULATIONS

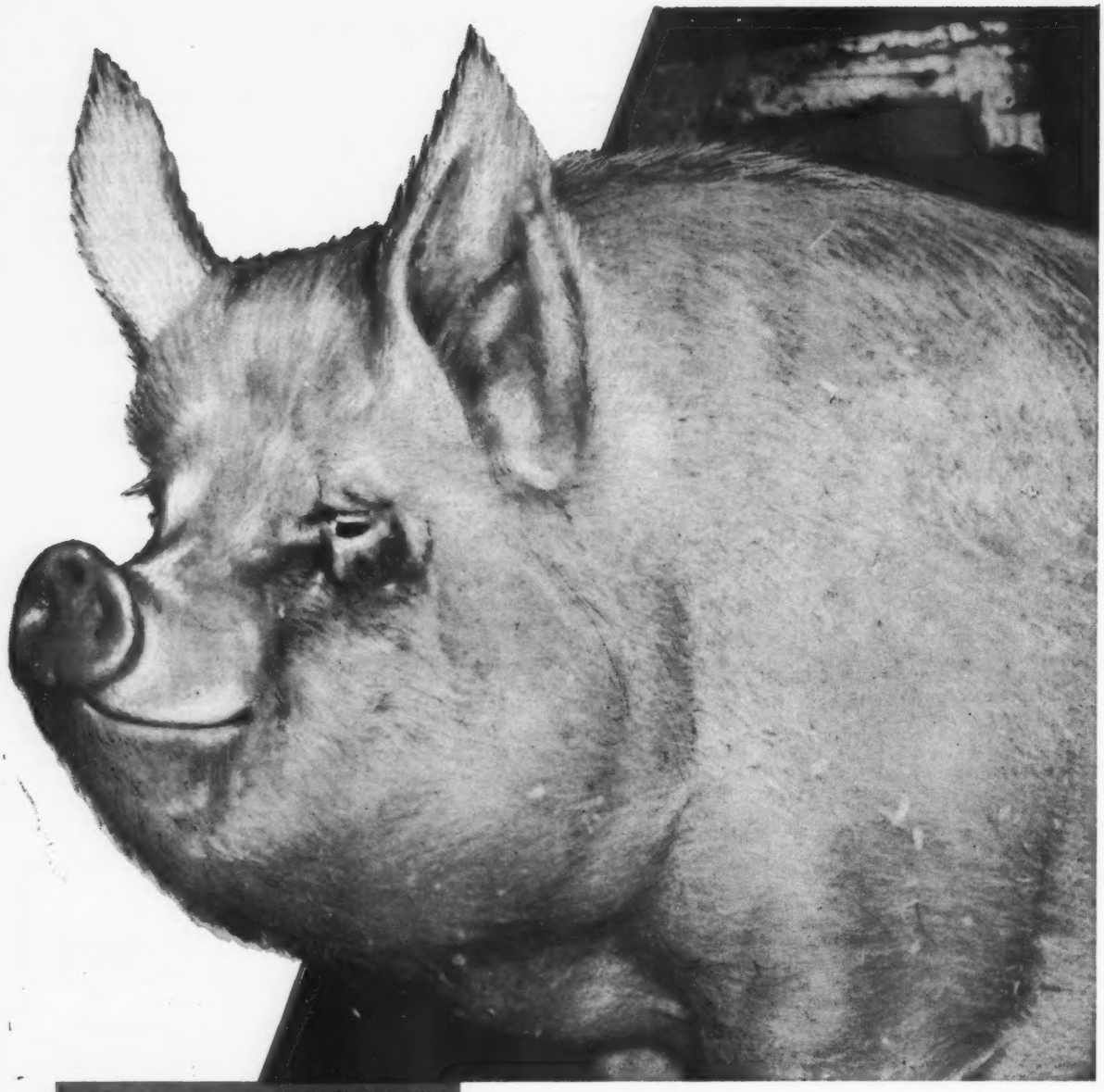
Buy for Less!

We will make on order in any concentrate formulations of the following:

2,4-D, 2,4,5-T, MCP, CHLORO-IPC
DDT, BHC, TOXAPHENE, HEPTACHLOR,
CHLORDANE, LINDANE, MALATHION

Rock Bottom Prices!

Box 455, Farm Chemicals Magazine



HE'S A BIG HAM

Pork chops, bacon and sausage, too. By market time, he'll be sleek and fat on rich feeds grown in well-fertilized soil.

Potash, an important component of many modern fertilizers, not only enriches the soil, but improves crop quality, helps build resistance to disease and increases product yield.

Potash produced by the United States Potash Company has two distinct advantages in the mixing of modern commercial fertilizers. It has the highest K_2O content, and is free-flowing and non-caking—important factors in fertilizer production.

As an investment in the land, potash pays handsome dividends to farmer and businessman.

SUNSHINE STATE POTASH
A PRODUCT OF NEW MEXICO U.S.A.

REG. U. S. PAT. OFF.

HIGRADE MURIATE OF POTASH 62/63% K_2O
GRANULAR MURIATE OF POTASH 60% K_2O MIN.

Southern Sales Office
Rhodes-Haverty Building, Atlanta, Georgia

UNITED STATES POTASH COMPANY INCORPORATED
30 ROCKEFELLER PLAZA
NEW YORK 20, N. Y.

Worden Named to MCA Post

The Manufacturing Chemists' Association has named George M. Worden as director of publicity. Former assistant director of advertising and publicity for Air Reduction Co., Worden had previously served on the MCA Public Relations Advisory committee and had been on loan with MCA for the past three months in connection with Chemical Progress Week.

McVickar at Chicago Institute

Malcolm H. McVickar, chief agronomist of National Fertilizer Association, was a principal speaker at the 13th annual Institute on Conservation, Nutrition and Health at Chicago, Ill., June 28-29, sponsored by Friends of the Land. Dr. McVickar spoke on "Fertilizer Demands to Meet Our Future Food Production."

"Health—From the Ground Up" was the theme for the Institute and much of the program was to be devoted to soil fertility and plant nutrition according to the NFA FERTILIZER NEWS.

Walker and Knapp Named

James S. Walker, manager of technical sales services, Hooker Electrochemical Co., and William S. Knapp, General Chemical division, have been elected chairman and vice-chairman, respectively, of the Labels and Precautionary Information committee of the Manufacturing Chemists' Association.

Walker, former vice-chairman, succeeds Robert D. Minteer of Monsanto Chemical Co.

Northeast ASA Meet

The Northeast branch, American Society of Agronomy, will meet at New Brunswick, N. J., on July 12-14. Hosts, the Departments of Farm Crops and Soils of the New Jersey Agricultural Experiment Station, have planned a program including talks on the soils and crops of their state and many tours. A Smorgasbord, courtesy of American Plant Food Council, is to be held on the evening of the 13th.

Cotton Conference Dates

Latest progress in controlling weeds and grass in cotton will be described in a panel discussion at the eight annual Beltwide Cotton Mechanization conference in Little Rock, Ark., July 28-30. Some several hundred representatives of the cotton industry, farm equipment manufacturers, farm organizations, USDA and Cotton Belt land grant colleges are expected to attend the meeting.

Report Improved Sales

Reports from the Manufacturing Chemists Association-Synthetic Organic Chemical Manufacturer's Association joint outing June 3-5 show that generally there has been a definite improvement in chemical sales during the first quarter of 1954, compared with the last quarter of 1953.

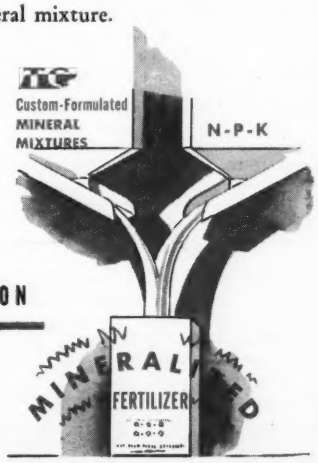
More intense competitive conditions are expected this year by many companies, assuming there are no changes in defense spending, and probably some easing off in the prices of some chemical lines.

IT'S AS SIMPLE AS

SALTING YOUR SOUP!

It is as easy to make a mineralized fertilizer as it is to salt your soup. Tennessee Corporation will custom-mix any combination of minerals to your own specifications. Thus there is only ONE ingredient to add to your regular fertilizer for a completely balanced plant food. It requires no additional labor or mixing facilities, since **TC** Mineral Mixtures come to your plant—in bulk or bag—already carefully mixed in controlled amounts of soluble and readily available forms of Copper, Manganese, Iron, Zinc, Magnesium, and Boron. Cut down on the number of items purchased, on raw material costs, and on handling . . . by mineralizing with a **TC** custom-formulated mineral mixture.

Samples, Specifications and Detailed Information on Request.



TENNESSEE TC CORPORATION

617-29 Grant Building, Atlanta, Georgia

Western Ent. Meeting

August 17-21 have been announced as dates for the 25th Rocky Mountain Conference of Entomologists scheduled to be held at the Cameron Pass 4-H Club Camp, 85 miles west of Ft. Collins, Colo. The meeting will be very informal, according to Geo. M. List, secretary of the group, with programs largely of the symposium type.

Southern RFD Conference

At the fourth annual conference of the National Association of Television and Radio Farm Directors, Southeastern region industry hosts included American Cyanamid Co., social hour; Ashcraft-Wilkinson Co., dinner meeting and the American Plant Food Council, banquet. Louis H. Wilson, APFC director of information, addressed the group at the banquet.

Eric Lund, account executive of Gardner Advertising Agency, St. Louis, Mo., presided over a panel on management viewpoint in radio and TV farm shows.

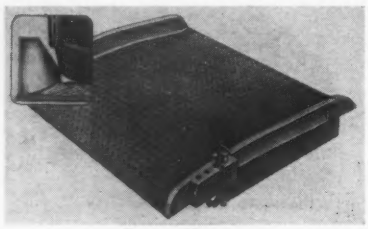
Fertiliser Society

The Fertiliser Society (of England) toured the Norfolk Agricultural Station, Sprowston, Norfolk, on June 24 and held its annual general meeting.

Equipment & Supplies

Safety Features Added to Penco Loading Ramps

Two new features of the Penco Magnesium Ramps, safety side rails and reinforced safety curb ends, are engineered and constructed to give added years of



Penco Ramp

time-saving operations with utmost efficiency and safety, according to Penco Engineering Co.

Penco car loading ramps are made in capacities from 3,000 pounds to 12,500 pounds; the truck loading ramps in capacities from 1,000 pounds to 6,000 pounds and the yard ramps from 4,000 to 16,000 pound capacity. All need only one-man operation, and are made from light-weight, heavy duty magnesium diamond safety plate.

Link-Belt Dryer Book

Link-Belt Co. has compiled a new book on its Roto-Louvre, an effective dryer, cooler or dryer-cooler which it says can successfully process hundreds of different products, including fertilizer.

A four-page section of the book is devoted to a comprehensive coverage of the principles of drying and cooling and the fundamental physical laws of heat transfer as the basis for each function of the Roto-Louvre. Other sections cover temperature and dust control, dimensions and four typical layouts, photographs of eight actual installations, a psychometric chart and a listing of over 200 materials which have been successfully processed by the Roto-Louvre. FARM CHEMICALS readers can obtain this booklet by circling 199 on the Reader Service card.

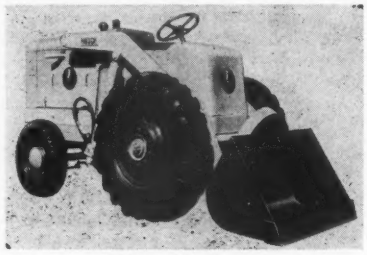
New Y & T Gas Fork Trucks

A new series of compact gasoline fork lift trucks with a high power-weight ratio has been manufactured by Yale & Towne Manufacturing Co. Called the G-52 Series, the trucks are available with pneumatic or solid tires in 2,000, 3,000 and 4,000 pound capacity models. The series was developed to fill a demand emphasized by a survey made in scores of plants and warehouses throughout the country. It points the way toward fork lift truck design of the future—smaller, more powerful, more efficient, more maneuverable, more versatile models, according to Yale and Towne.

Torque Converter Drive On New Payloader Models

Introduction of new models of the "HA" and "HAH" front-end shovel-loaders with torque-converter-drive as standard equipment was recently announced by The Frank G. Hough Co. The "HAH" model is also equipped with power steering.

The "HA" has a pay-load capacity of 16 cu. ft. and a struck-load capacity of 12 cu. ft. Pay-load capacity of the "HAH"



Hough Payloader

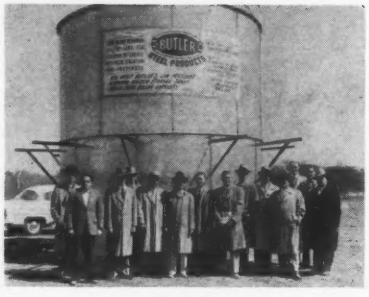
is 24 cu. ft. and struck-load capacity is 18 cu. ft., an increase over the former model. Improved performance is offered with the torque converter, which is of the three-element, self-cooled type that automatically multiplies torque output of the engine in direct proportion to the load requirements. During light-load conditions it automatically reverts to efficient fluid-coupling action, Hough states.

For full information on the new Payloader models, circle No. 197 on the Reader Service Card.

Classified

For Sale: Dry Mixing Fertilizer Plant. Good condition. Capacity ten thousand tons. Located in North Alabama; two railroads, Tennessee River, seven paved highways, paved farm to market roads. Well established trade. Address "465" care FARM CHEMICALS, Philadelphia 7, Pa.

Suppliers' News



At a recent Allied Chemical & Dye Corp. sales conference, Butler Manufacturing Co. displayed bulk and skid tanks for the storage and transportation of liquid nitrogen fertilizer solutions. Handling and application of liquid nitrogen fertilizer was discussed. Left to right are: H. S. Kramer, E. A. Streich, P. V. Whiting, E. M. Harper, AC&D; C. W. Jackson, BMC; W. S. Colvin, A. B. Reagan, J. P. Pierce, A. W. Kinnard, AC&D; Carl Hull, BMC; G. L. McGuffey, AC&D; Lou Tempel, BMC; W. B. Van Wylen and D. T. Friday, AC&D.

Bagpak division, **International Paper Co.,** plans to open a converting plant for the production of multiwall sacks in mid-July at Mobile, Ala., adjacent to International's paper mill. Pasted valve, pasted open-mouth, sewn valve and sewn open-mouth sacks will be produced in the 50,000 square foot plant.

S. D. Andrews has been named plant manager; C. B. McCord, assistant plant manager and Asa Morgan, superintendent.

Outstanding stock of American Paper Exports, Inc. has been acquired by **International Paper Co.,** Richard C. Doane, International president, recently announced. APEX will continue to be headed by I. C. Baldwin, president, and the company's overseas organization will remain unchanged, said Doane.

Selling all the way through—the story of **St. Regis Paper Co.'s** methods of selling to industry—has been presented by Kenneth D. Lozier, vice president in charge of advertising and sales promotion, to Sales Executives Clubs in New York City, Toledo, O., Worcester, Mass. and the quarterly meeting of the New England Council. A motion picture in color was used to highlight parts of Lozier's talk.

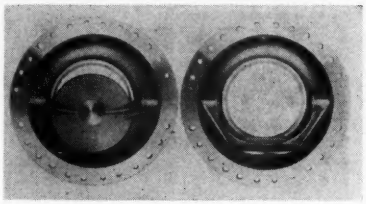
Volumetric Filling Unit

The MRM Co. has developed a volumetric attachment which can be installed on any liquid filling machine. Because of its accuracy in filling at high speeds, the unit is ideal for filling aerosol containers, states the company.

The unit consists of special type filling heads, adjustable for variation of fill by means of a specially threaded cylinder to a tolerance of one gram, plus or minus, per each cylinder revolution. These receptacles become part of the filling operation, and it is they which are first filled through a special valve to the specified amount for each container. At this point they are discharged automatically into the containers.

Dust Tight Gemco Valves

A specially treated, aluminum, self-cleaning, dust-tite valve for blenders, pipeline feeders, etc., has been added to the



Gemco Valves

line of Gemco valves by General Machine Co. of New Jersey. Now available for the first time in aluminum, treated to prevent galling and wearing at the metal-to-metal contact, this valve incorporates all the advantages of the self-cleaning, dust-tite Gemco opening mechanism with the light weight and resistance to chemical corrosion inherent to aluminum.

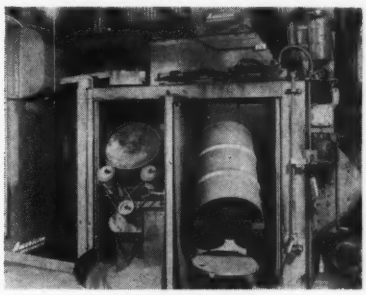
Coatings Show Leaks

After five years of research, Milsheff Corp. has added a supplementary coating to its Spray Stops which shows a brilliant color change when hit by leaking chemicals—from a heavy stream down to a very fine spray. Spray Stops are protective covers for flanges and valves in pipelines carrying corrosive chemicals. They deflect chemical leakages, letting acids and caustics drip harmlessly to the ground.

Drum Cleaning Unit

A new airless abrasive blasting machine for the reconditioning cleaning of 30 and 55 gallon steel drums before painting and coating operations has been announced by American Wheelabrator & Equipment Corp.

Capable of cleaning the exterior surfaces of closed-end drums and both exterior and interior surfaces of open-end drums, together with lids, the machine is equipped with a hydraulically-rotated table with a partition that divides the machine into two compartments or work stations. Each work station consists of two power-driven spinner shafts which rotate one drum in the blast zone and also has a fixture for holding the lids in the blast. This arrangement permits one station to be loaded and unloaded while the other is in the blast zone.



Blasting Machine

New Mobilift Unit

Latest addition to the Mobilift line is the M-324 fork lift truck with a capacity of 3,000 pounds at 24 inch load center, according to Lamson Mobilift Corp., the manufacturer.

Its features include "Mobil-Matic Drive" —a heavy-duty, oil immersed, multiple disc clutch, a constant mesh transmission and a fluid coupling. Also incorporated in the M-324 is the "Hydra-Lizer," which consists of equalizers mounted on each rear wheel and connected hydraulically to cross compensate the truck when the front or rear wheels pass over bumps or depressions.

LPGAS and ANHYDROUS AMMONIA TANKS

18,000 and 30,000 GAL. CAPACITY AVAILABLE for IMMEDIATE SHIPMENT

Wire or write for information

BIRMINGHAM TANK COMPANY

Birmingham, Alabama
Division of The Ingalls Iron Works Company

CCC
Reg. U.S. Pat. Off.
DILUENT

COMPLETE dispersion for easy mixing and superior dusting properties

CONSISTENTLY free flowing from all types of dusting equipment

COMPATIBLE with all insecticides now in general use

COVERS more plants and greater area than diluents of lesser density

CONDITIONS insecticides, preventing packing and lumping in storage

COATS plants, leaves and stems with uniform toxic film

FREE TEST SAMPLE
. . . gladly sent on request along with detailed information and prices.

Calcium Carbonate Company

222 West Adams Street, Chicago 6, Ill. PLANT LOCATIONS: Quincy, Ill. • Weeping Water, Neb. • Carthage, Mo. LABORATORIES: 520 South Fourth Street, Quincy, Ill.

SUPPLYING INDUSTRY WITH CALCIUM CARBONATE PRODUCTS FOR OVER A QUARTER OF A CENTURY

Washington Report

By Fred Bailey & John Harms

Congressional passage of the Miller Pesticide bill—all but completed at press time—does not mean establishment of tolerances immediately. While Food & Drug officials have completed the technical work on more than 100 of the newer pesticides, it may be several months before any are proposed.

Before tolerance machinery can go into effect, Food & Drug lawyers will have to write new regulations to conform with the legislation. Also, some portions of the bill go into effect over a period of about one year. We don't look for any tolerances to be made effective much before the end of this year—if then.

After the June 23 hearing by the Senate Labor and Public Welfare Committee, the House-passed Miller bill was scheduled to go on the Senate consent calendar. If no one objected, the measure would be cleared with little fanfare.

The Miller bill, sponsored by Rep. Miller of Nebraska, outlines procedures to be followed in negotiations between manufacturers of chemicals and Food & Drug before tolerances are officially established. Tolerances could be proposed by either the pesticide maker or the government.

Procedure includes a 90-day period in which Food & Drug must decide on the merits of a manufacturer's proposal, plus provision for appeals to the Federal courts. Thus more than three months could elapse between a tolerance proposal and the time it would go into effect.

Don't plan on further issuance of fast nitrogen facility tax write-offs under the government's domestic production capacity booster program. The Office of Defense Mobilization has approved the last certificates of necessity—permitting rapid depreciation for tax purposes—called for under the present program to boost the domestic production capacity to 3.5 million tons by the end of 1956.

This phase of the expanded nitrogen production program, therefore, is officially terminated. Only chance for additional companies to get such aid in the near future would be, according to ODM sources, only if the present goal of 3.5 million tons was expanded still further. They are quick to point out, however, that there are no indications of such a move in the near future.

Last certificates approved by ODM covered total additional capacity in terms of contained nitrogen of 417,000 short tons. Distribution of this capacity included 86,400 tons covered in a certificate withdrawn from the Monsanto Chemical Co. Of the total, 278,000 tons represents new capacity, and 139,000 tons is involved in upward adjustments in construction underway or completed.

Commerce department insiders privately admit the government's world survey of insecticide supplies, consumption, production and so forth may take longer than officials had hoped.

Early hopes were that diplomatic groups in about 65 nations being canvassed would get information back within several months. But Commerce, through State department facilities, is planning to send out a follow-up questionnaire to speed up the process. As a result, don't expect a published report much before this fall.

From the air—a view of rock storage and dryers at Pierce, Florida, center of A.A.C. mining operations. Florida Pebble Phosphate Rock is the source of phosphorus widely used in the chemical industries, in its elemental form as well as in phosphoric acid, phosphates and phosphorus compounds. This pebble rock is also the principal source of the most important—and most generally deficient—plant food element essential in maintaining and improving crop yields. Health, growth, life itself, would be impossible without phosphorus—often called the Key to Life.

AA Quality...

for over 85 years a symbol of quality and reliability

Part of the almost continuous procession of freight cars that load at Pierce.

principal AA QUALITY products

All grades of Florida Pebble Phosphate Rock
AA QUALITY Ground Phosphate Rock
All grades of Complete Fertilizers **Superphosphate**
Gelatin **Bone Products** **Salt Cake** **Ammonium Carbonate**
Sulphuric Acid **Fluosilicates** **Insecticides and Fungicides**
Phosphoric Acid and Phosphates
Phosphorus and Compounds of Phosphorus

THE AMERICAN AGRICULTURAL CHEMICAL COMPANY

GENERAL OFFICE: 50 CHURCH STREET, NEW YORK 7, N. Y.

33 FACTORIES AND SALES OFFICES, SERVING U.S., CANADA AND CUBA—ASSURE DEPENDABLE SERVICE

Domestic pesticide officials are jittery over the relatively short DDT supply . . . fear FOA shipments may prove to have been too heavy resulting in a possible critical shortage situation before the new season is far along.

The General Services Administration bought almost 18 million pounds of DDT for the Foreign Operations Administration from Jan. 1 through June. The bulk of this went to India, some to Pakistan.

GSA buying of DDT for FOA account will continue . . . officials say. At press time, the government's purchasing organization was preparing to accept bids for a large amount of DDT for FOA shipment to Korea.

GSA officials don't share the pessimism of farm organizations and others concerned with domestic supply. They told FARM CHEMICALS that the amount already bought by GSA is "only a drop in the bucket." Actually GSA purchases through June amounted to almost a fourth of the 1953 production of 84 million pounds. Officials say that they have "no difficulty" in getting offers . . . no indication that supplies are short. "DDT salesmen come in with offers almost daily," one official told us.

First official, but preliminary, poundage report of 1953 production of organic farm chemicals has been released by the Tariff Commission. The report shows production amounted to 356 million pounds of pesticides and other organic farm chemicals. That's a drop of 15 per cent from 418 million pounds produced in 1952. Sales in 1953 totaled 334 million pounds, worth $119 million, compared with 331 million pounds and $133 million in 1952.

Sales of cyclic pesticides and other cyclic chemicals in 1953 totaled 282 million pounds valued at $99 million. Year before, 289 million pounds were sold for $111 million. Production in 1953 was 297 million . . . a drop of 20 per cent from the 372 million pounds in 1952.

Early field reports from the Cotton Belt indicate that growers are bearing down on fertilizer use—may set a record in the percentage of cotton acreage fertilized. Fertilizer use per acre already is running about 30 per cent higher than normal. Acreage planted has been estimated at around 20 million—somewhat below the 21.4 million permitted by Federal marketing quotas.

Secretary Benson's announcement of a 55 million acre wheat production goal for 1955 heralds one of the most rigidly controlled crop years on record. He is expected to follow up with a cross-compliance program which will control almost every acre planted next year to crops which receive price support. The wheat allotment cuts seven million acres from 1954 production. Similar cuts are expected for such things as corn, soybeans and other grains.

Cross-compliance requires that farmers comply with production restrictions on all crops in order to get support for any. It means that in 1955 there will be about 40 million acres of farmland diverted to other uses. Much of this land could go into potatoes and other vegetables, which require fertilization, or into hay, pasture and other conservation practices.

High farm price supports of the past now are expected to be approved for another year. Congress is getting set to legislate an omnibus farm support bill extending present props, and . . . despite reports to the contrary . . . the President is likely to go along, although reluctantly. The high supports will act as a floor under farm income in 1955 in the face of huge surpluses. While market prices this year are likely to return farmers less than the support levels for many cash crops, supports are being credited by impartial economists with keeping farm prices and income from sinking deeper because of market gluts.

. . . there are several starting points for its many uses and users

"What shall we use?" This question always confronts management when it is considering raw materials to be used in operating processes, and is not always easy to decide.

In the manufacture of sulphuric acid, the use of sulphur in some form is mandatory, whether it be elemental sulphur or sulphur in combination with other elements. No single factor can determine which raw material should be used. Relative supply situation, cost of transportation, cost of plant and cost of use are all considered by management.

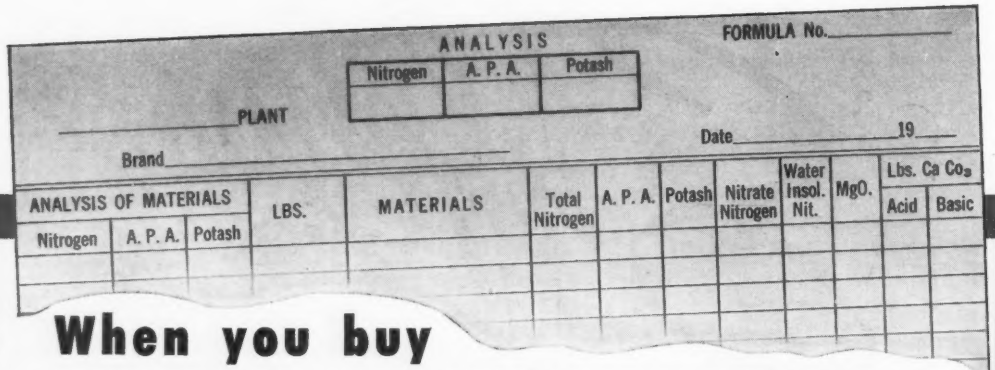
For three decades elemental sulphur as a raw material has had first choice as a solution of the problem, "What shall we use?"

Texas Gulf Sulphur Co.

75 East 45th Street, New York 17, N. Y.

Sulphur Producing Units

- NEWGULF, TEXAS
- MOSS BLUFF, TEXAS
- SPINDLETOP, TEXAS
- WORLAND, WYOMING



When you buy NITROGEN FERTILIZER MATERIALS

...GET TECHNICAL SERVICE, TOO!

LION'S

"Controlled Quality"

and what it means to you

When you visit El Dorado or New Orleans you will want to inspect Lion's giant chemical plants where Lion Nitrogen Fertilizer materials are manufactured. You'll be impressed by the painstaking efforts to assure highest quality products... reaching you in first-class condition. This is what we mean by "Controlled Quality"—which can mean a great deal to you.

"Controlled Quality" is your assurance that you will be formulating with only top grade nitrogen materials... that you will be selling *quality products.*

Enduring business success must be built on high quality. When you buy Lion Nitrogen Fertilizer materials, you can be sure you're building your business on a sound foundation... fortifying yourself for the highly competitive period ahead.

LION

offers one-stop nitrogen service *and* specialized technical assistance

LION ANHYDROUS AMMONIA—For formulation. A uniformly high-quality basic product. Nitrogen content, 82.25%.

LION AQUA AMMONIA—For formulation or acid oxidation. Ammonia content about 30%. Other grades to suit you.

LION AMMONIUM NITRATE FERTILIZER—For formulation or direct application. Improved spherical pellets. Guaranteed 33.5% nitrogen.

LION NITROGEN FERTILIZER SOLUTIONS—For formulation. Three types to suit varying weather and manufacturing conditions.

LION SULPHATE OF AMMONIA—For formulation or direct application. Large free-flowing crystals. Guaranteed nitrogen content, 21%.

TECHNICAL SERVICE—Lion provides special technical assistance for fertilizer manufacturers. Write to CHEMICAL SALES DIVISION for quick service.

LION OIL COMPANY
EL DORADO, ARKANSAS

Stress Farm Public Relations at APFC Convention

Agriculture Secretary Benson addresses APFC.

AGRICULTURAL public relations occupied the spotlight at the ninth annual convention of the American Plant Food Council at Hot Springs, Va., on June 10-12. Other highlights included a prediction that fertilizer consumption will continue its upward trend during the current year, a plea for farm programs based on abundant productions and the suggestion that a national agricultural public relations program be established.

Better Selling

In his opening remarks, Paul T. Truitt, APFC president, stated that a better selling job must be done for the industry's customers—the farmers—and he cited the need for "working more closely and more effectively with government agencies, vo-ag teachers and others.

"Farmers have undoubtedly earned a better reputation than they enjoy in the view of many consumers," Truitt said. "An understanding and appreciation of the 10 per cent that feed and cloth the 90 per cent will be improved to the extent we in industry can be a party in helping educate the public about farm problems. This is an integral part of a 'better selling' job."

Warning that "too many folks have not drawn a distinction between the problem of surpluses and efficiency in farming," Truitt emphasized that everyone should understand the importance of decreased unit production farm costs.

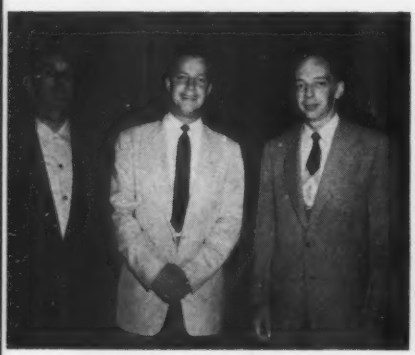
The council head predicted possible new records for fertilizer consumption during the current crop year, in both tons and in plant nutrients. He pointed out that the fertilizer industry's share of the farmers' dollar increased in 1952 and held its own last year. He credited this to accelerated extension, research and educational pro-

Agricultural Public Relations Panel. Left to right: Robert H. Reed, Stanley Andrews, J. M. Eleazer & Ed Lipscomb.

LEFT: W. B. Copeland, Smith-Douglass; Parke C. Brinkely, Va. Commissioner of Agr.; R. F. Hopkins, San Jacinto Div., Smith-Douglass. RIGHT: W. E. Shelburne, Armour; W. T. Wright, Royster; J. E. Sanford, Armour.

LEFT: J. J. Joyce and R. S. Hill, Reliance Fert. & Lime Corp.; Ward Cole, Joseph C. Jett. RIGHT: James H. Culpepper, Smith-Douglass Co.; H. M. Albright, U. S. Potash Co. and Omar Sanders, Fert. Industries, Inc.

LEFT: T. E. Camp, Jr., Southwest Potash Corp.; H. V. Miller and B. F. Sutherland, Armour Fert. Works. RIGHT: S. F. Thornton, F. S. Royster Guano Co.; Prof. Grant B. Snyder; J. M. Eleazer, Clemson Extension Service.



LEFT: G. R. Nooe, Ohio Valley Fert.; O. R. Yates, Jr., Ashcraft-Wilkinson and D. W. Christensen, Royster. RIGHT: Sam Preston, American Cyanamid (center), with J. E. Ames, Jr. and C. B. Robertson, Robertson Chem.

grams of state and Federal authorities.

Truitt closed his address with a review of APFC activities during 1953 and mentioned future plans which, he stated, include the production of another major film, more television shorts and emphasis on other phases of an expanded educational program.

Use Abundance Wisely

In a talk on "Foods, Fibers, Fears and Facts," Secretary of Agriculture Ezra Taft Benson emphasized that "we do not have to fear abundance if only we learn to use it wisely."

"What farm programs we have in the future," he added, "they should be based over the long pull on abundant production rather than scarcity." Benson stated that the current administration is the first to "attempt to give marketing the important place it deserves in the agricultural picture" and cited, as a part of the program, the new price support program, trade missions, disposal programs, cooperation with trade groups, the beef merchandising campaign and a new emphasis on marketing research.

The USDA head considers "most basic of all," utilization and marketing research and education. "It's time we started out-promoting some of our competitors," he added. "I'm a little tired of watching other segments in the economy outpromote agriculture."

National Program

Ed Lipscomb, director of public relations for the National Cotton Council, a member of the APFC panel on agricultural public relations, suggested the establishment of a national program for the promotion of agriculture. He emphasized that the need for such a program, one to bring before the public the farmer's "problems, position and progress," already exists and is not a thing of the future.

Faulty communications were cited by the NCC executive as the primary reason for bad farm public relations, the current situation in which the farmer is "misunderstood and unappreciated by the public" and the lack of a national program.

Three major liabilities to the

farmer from a public relations viewpoint, according to Lipscomb, have been the immoderate politician, the professional hierarchy of labor and the situation that exists because virtually all mass media is edited primarily for city consumption.

In presenting some suggestions for action as individual companies, Lipscomb described the possibility of a speech, devoted to the farmers' story, prepared and delivered to every dealer who could, in turn, present it to major organizations in his particular area. Such a speech could be accompanied with a "write-in type" news account for newspaper coverage and could also serve as the subject for a farm radio panel.

Moderator's Comments

The panel of four agricultural experts was headed by Robert H. Reed, editor, COUNTRY GENTLEMAN, and president, American Agricultural Editors' Association. Emphasizing that public relations for agriculture must be improved, Reed stated that "there has never been a time when the farmer rated lower with the general public."

The noted editor added that "business can shoulder a great part of the public relations job for agriculture, and business can teach salesmanship to agriculture," pointing to the failure to inform the public of who gets what share of the consumer's dollar as one major lack in farm public relations.

He suggested that rather than speaking so constantly of surpluses and "bewailing their effects," we might well turn the proposition around and place greater emphasis on our capacity to produce. Reed described 4-H and FFA groups as among the "best agents of good farm public relations," adding that members of such groups have an appeal to businessmen and the public.

Panel Members

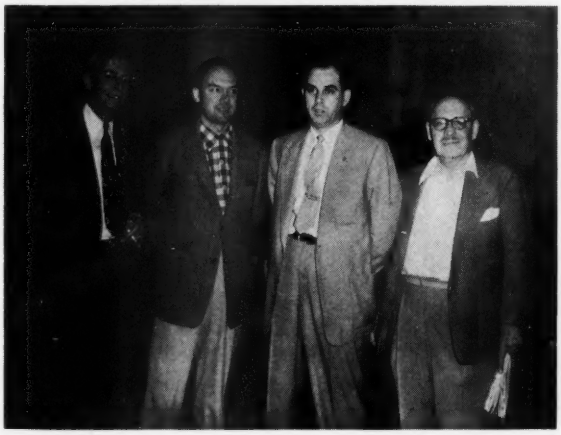
Other members of the panel included Stanley Andrews, executive director of the National Project in Agricultural Communications, Michigan State College, and J. M. Eleazer, Clemson Agricultural College. Andrews discussed the use of mass communications media and stated that the developments and techniques in this field "as extension teaching arms should make it possible for agriculture to keep fully in pace with industry and other parts of the economy in the application of new and efficient techniques.

He declared it "our responsibility to utilize these facilities for the

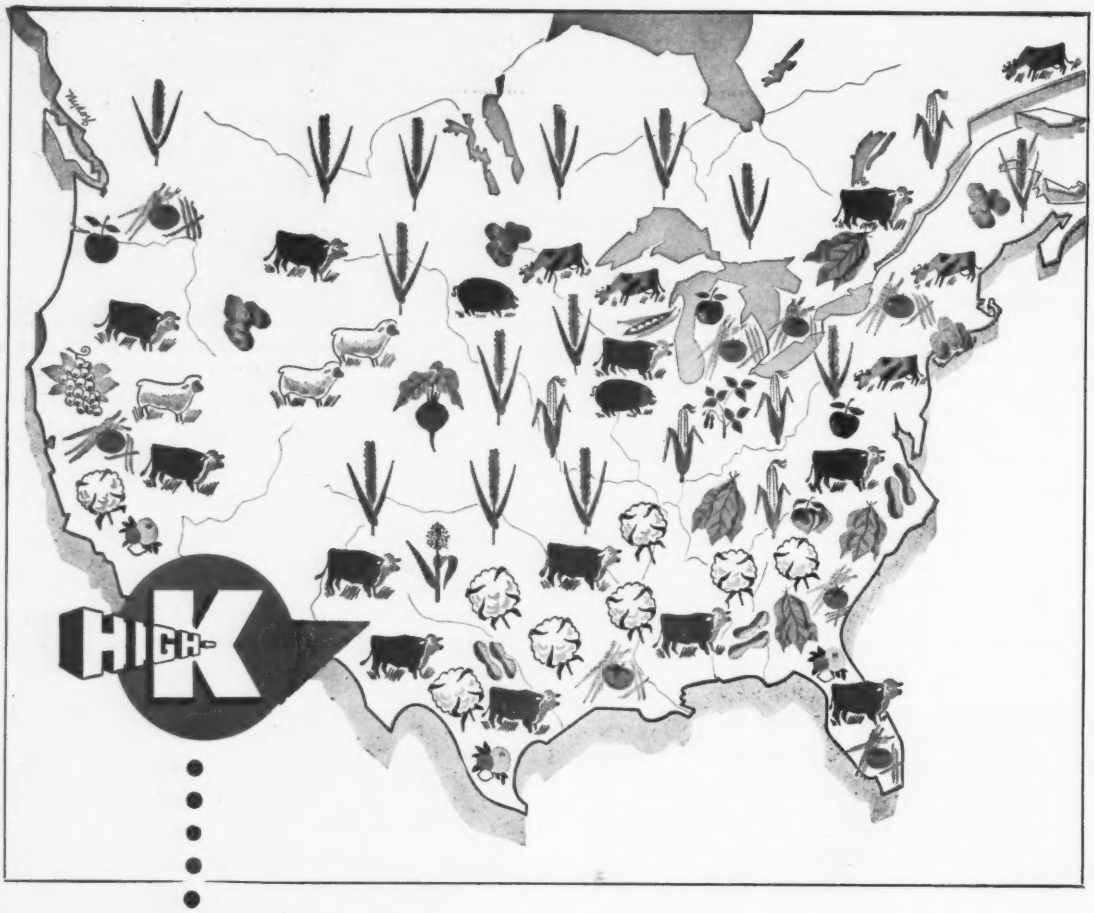
L. A. Krebs, Baugh & Sons Co.; C. C. Arledge, Virginia-Carolina; M. S. Wright, Texas Farm Products Co. and James Gorman, of American Cyanamid Co., in Homestead.

R. W. Breidenbach, Commercial Solvents; F. G. Keene, DuPont; M. S. Wright, Texas Farm Products and "Dugan" Taylor, Grand River Chemical division, Deere & Company.

M. W. Whipple, of Olds & Whipple, with St. Regis Sales Corp.'s Harry Hughes, John Dively and John F. Gruber.



Ed Hubbard and Proctor Gull, Spencer Chemical Company, with H. H. Tucker, Coke Oven Ammonia Research Bureau.



Southwest serves agriculture

...by using modern mining facilities and up-to-date processes to produce HIGH-K* Muriate of Potash for plant food manufacturers.

Southwest Potash Corporation

HIGH-K Potash

*Trade-mark

benefit and enlightenment of farm people and of all the nation on the real role which agriculture plays in the national economy."

"Government financed agricultural research, tax-paid agricultural leaders and teachers are standard and accepted practice in the United States," Andrews continued. "Few of us realize that the United States probably goes farther in this than any other nation. Yet what we do in this respect is small in relation to the importance of agriculture to our economy."

Andrews also stated that fully 50 per cent of the nation's farmers are falling behind the rest in the adoption of new and efficient farm practices.

Radio & Press

In discussing the powers of radio and the press, Eleazer, Clemson extension information specialist, emphasized that those concerned with getting information to the farmer should provide the farmer with the required information on a subject without attempting to consider "every angle and shade of probability surrounding the item."

Farmers are constantly looking for new things, he stated, while warning against "killing with caution" new developments. Eleazer also suggested that those engaged in the preparation of farmer bulletins and information pieces place more emphasis on getting the simple facts to the farmer with less emphasis on fancy layout and makeup.

Eleazer emphasized the need for reiteration, simplicity and naturalness in approaching the farmer through any publication.

Potash Imports

Rep. C. B. Hoeven began his remarks with a review of the potash import hearings, pointing out the potential damage that might result through purchases of iron curtain potash. The Iowa congressman stated that a decision is expected shortly on hearings concerning importations that took place earlier this year.

Hoeven suggested, as did Benson and Reed, that the country is better off under an economy of abundance rather than one of scarcity. The farmer isn't to blame for surpluses, he added, pointing out that the agriculturist has little to say about the prices he receives or other factors involved.

Emphasizing that farmers are also not the cause of high prices, he pointed out that only 26 cents of each dollar is used for food and that the farmer gets only 45 per cent of the food costs. Hoeven also showed that, in comparison with many other government subsidies, the farm program to date has cost comparatively little.

James is Optimistic

In considering the long term agricultural outlook, Dr. H. B. James, head, Department of Agricultural Economics, North Carolina State College, stated that he is optimistic about prospects for farm people although the future will not be "a bed of roses for farm people."

As factors favoring his forecast he cited the growing population, reduction of people involved in the agricultural plant, new technology, a broader knowledge of problems and their solutions, increased labor output and experience in working with the government.

"It astounds me that the fertilizer industry does not sell as much fertilizer as it would be profitable for their customers to buy," James concluded, "I believe more work emphasizing the economics of fertilizer use would benefit the fertilizer industry as well as farmers and the general public."

Banquet Speaker

Dr. Paul D. Sanders, editor, SOUTHERN PLANTER, was the main speaker at the banquet session of the convention and told delegates that their industry holds the key to farm prosperity.

He also emphasized the need for increased conservation of all resources and for creating an "economic atmosphere that will make it possible for the farmer to maintain the fertility of his soil."

Contest Winners

During the June 11 session, Robert P. Crossley, editorial director, CAPPER'S FARMER, and Earl W. McMunn, editor, THE OHIO FARMER, received awards in the second annual soil builders contest for editors. The contest is sponsored by APFC and approved by the American Agricultural Editors' Association and is designed to recognize "superior journalistic contributions . . . toward the building of the soils of our nation."

Louis Wilson, APFC dir. of info., with recipients of awards in Soil Builders Contest for Editors, Robert Crossley, "Cappers Farmer," and Earl W. McMunn, "The Ohio Farmer."

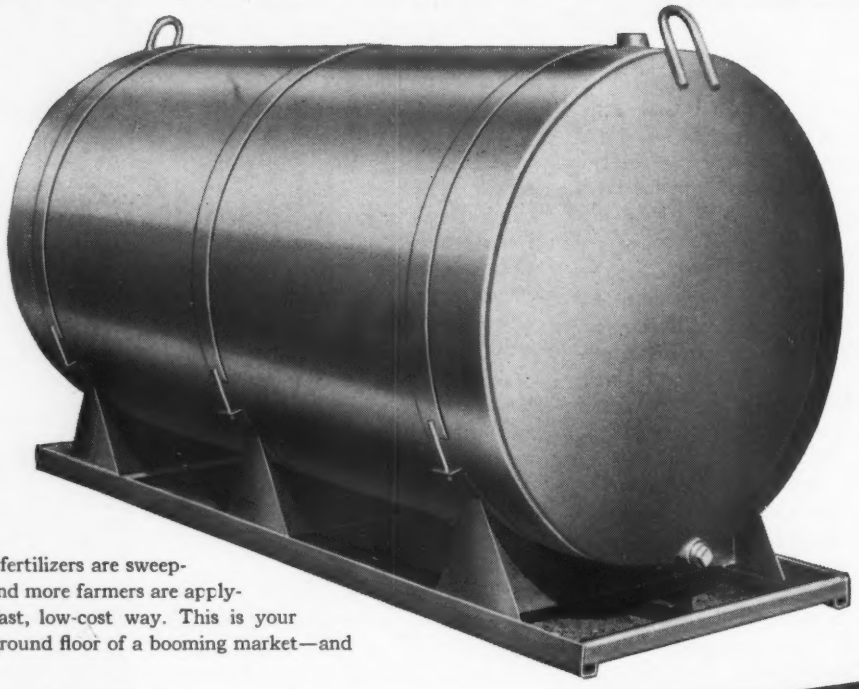
Dr. H. B. James addressing APFC.

The presentations were made by Louis H. Wilson, council secretary, and went to Crossley as the winner among magazines of more than 300,000 circulation and to McMunn for the top book in the less than 300,000 class.

Elected to service on the council board of directors were J. D. Stewart, Jr., Federal Chem. Co.; J. R. Rossman, Woodruff Fert. Works; F. T. Techter, Nitrogen div.; A. F. Reed, Lion Oil Co.; M. S. Wright, Texas Farm Prod. Co.; G. W. Gage, Anderson Fert. Co.; H. C. Fisher, Diamond Fert. Co. and W. L. Waring, Lyons Fert. Co. ◆

NOW! Cash in on liquid nitrogen solution boom

with new BUTLER aluminum TANKS



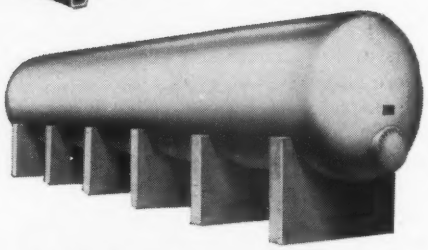
Welded low-pressure skid tank for on-farm storage. Available in 500, 830 and 1000-gallon capacities. Others (without skids) from 100 to 1000 gallons.

Liquid nitrogen solution fertilizers are sweeping the country! More and more farmers are applying nitrogen this new, fast, low-cost way. This is your chance to get in on the ground floor of a booming market—and profit as demand soars!

Butler now offers two types of special alloy non-corrosive aluminum bulk storage tanks for nitrogen solutions: (1) Bolted vertical 22,000-gallon tanks for non-pressure solutions; (2) Welded horizontal 12,000 and 22,000-gallon bulk storage tanks for low-pressure solutions.

Smaller size horizontal aluminum tanks in 100, 270, 500, 830 and 1000-gallon capacities are also available. The 500, 830 and 1000-gallon tanks can be factory-equipped with skids for on-farm storage or transporting solutions from bulk station to farm.

Act now and cash in! Send coupon today for full information.



Welded low-pressure tank for bulk storage. Available in 12,000 and 22,000-gallon capacities.

Bolted 22,000-gallon non-pressure tank for bulk storage.

BUTLER STEEL PRODUCTS

BUTLER MANUFACTURING COMPANY

Manufacturers of Oil Equipment • Steel Buildings • Farm Equipment Dry Cleaners Equipment • Special Products

Factories located at Kansas City, Missouri • Galesburg, Ill. • Richmond, Calif. Birmingham, Ala. • Minneapolis, Minn.

BUTLER MANUFACTURING COMPANY
7455 East 13th Street, Kansas City 26, Missouri

Please send me full information on Butler aluminum
Welded bulk tanks ☐ Bolted bulk tanks ☐ Small horizontal tanks ☐ Skid tanks ☐

Name_____

Firm_____

Address_____

City_____ Zone____ State_____

Benson Calls for 'Useful, Permanent Abundance' at

NFA Convention

TWO well attended workshop sessions, one on granulation processes and the other concerning fertilizer marketing, topped the program for the National Fertilizer association convention at The Greenbrier, White Sulphur Springs, W.Va., on June 14-16. Delegates to the meeting also heard Secretary of Agriculture Ezra Taft Benson and Congressman W. Sterling Cole, featured speakers for the affair.

Agriculture's Goal

In his prepared address, Secretary Benson summed up the goal of American agriculture as "useful, permanent abundance" and discussed the type of planning he considers necessary to reach this target. He stated that common sense agricultural programs offer promise of an almost limitless abundance.

Speaking of the increased need for fertilizer and increasing production, Benson stated that USDA researchers believe that problems of maintaining physical condition of high analysis goods can be so handled that in the next few years the average analysis of mixed fertilizers can be raised to at least 30 per cent.

The USDA head pointed out the importance of fertilizers in connection with water utilization and cited research which shows that fertility levels can affect water utilization by crops.

Benson stated that the time has come when the Nation needs a "thoroughly complete, coordinated program for the wise use of water. We must be realistic about the climate," he continued. "We bring hardship on ourselves when we farm in expectation or hope of 30 inches of rainfall where the average is only 18 and where the average often fails to come."

After completing his scheduled address, Benson again spoke to the NFA group and emphasized his faith in the President and in rural people and his belief that "a subsidized economy is not good for man.

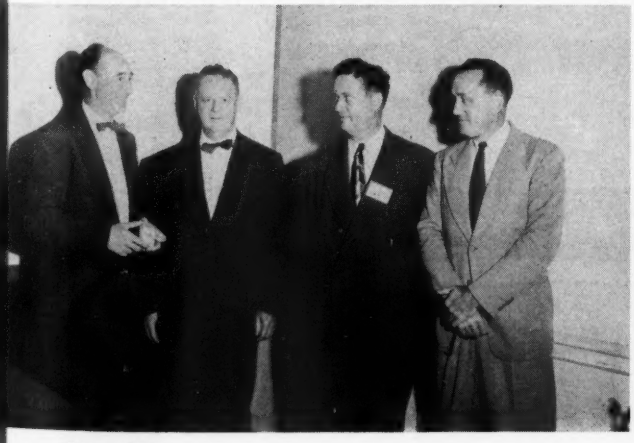
"Farmers want to produce for a free market," he stated, "not for government bounties." Benson added that he considered it a "sorry state of events when a program is discarded because of political feasibility."

Role of Atomic Energy

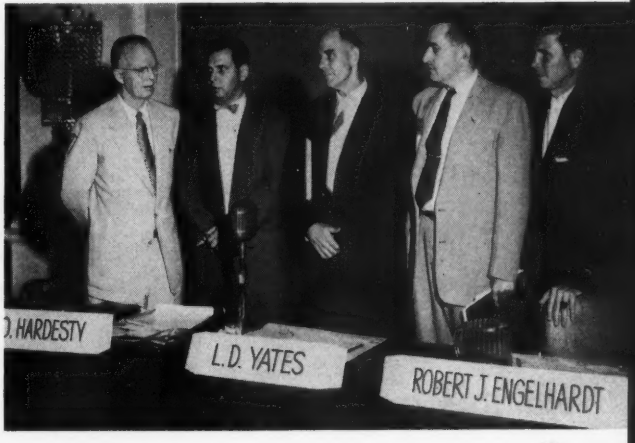
Representative W. Sterling Cole (R.—N.Y.), chairman of the Congressional Joint Committee on Atomic Energy, spoke on the peaceful role of atomic energy, citing the many applications of radioisotopes, radiation and the promising development of atomic power.

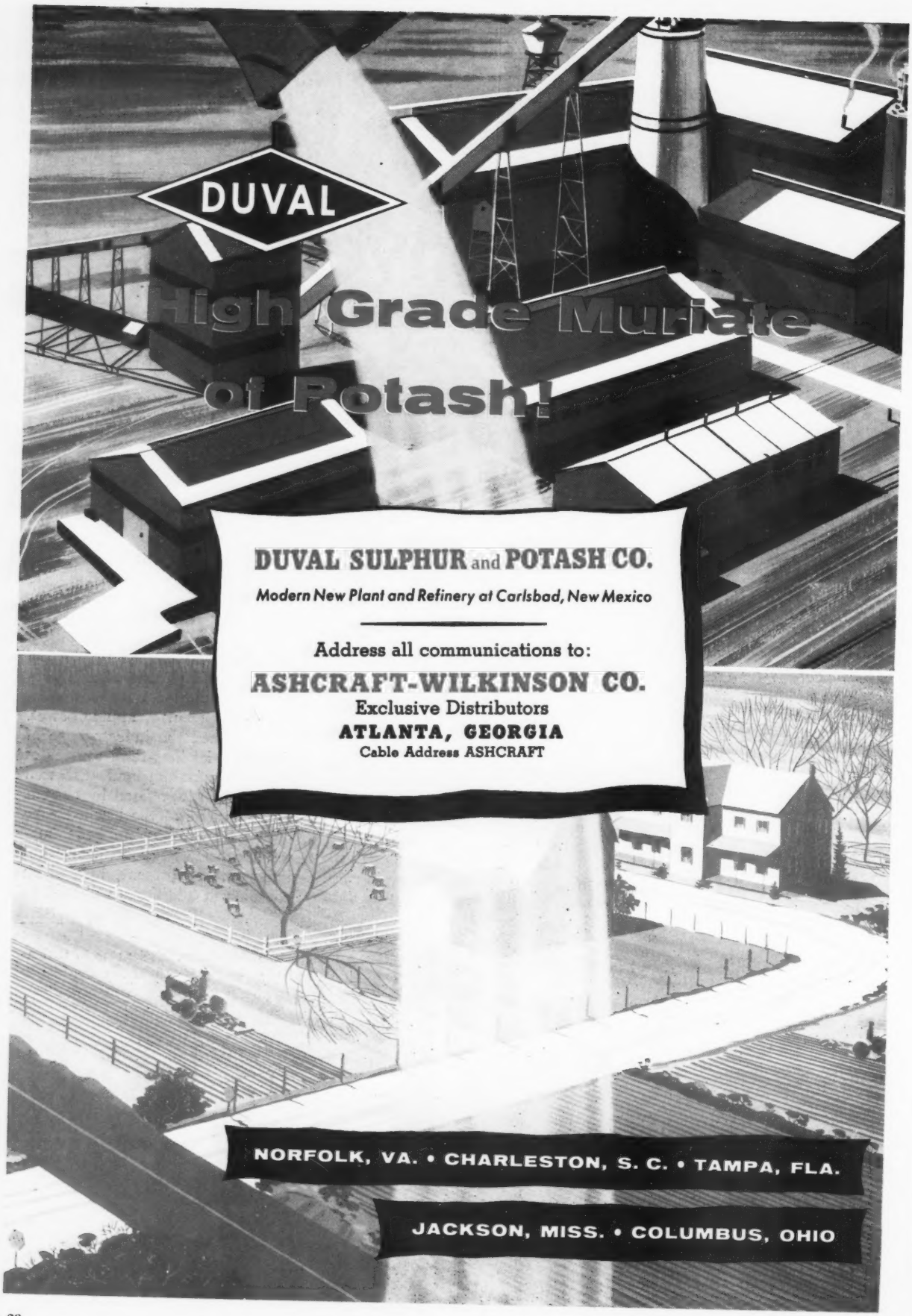
He termed the industry one of the potential long-term sources of domestic uranium and discussed the possibilities offered by current investigations of the leached zone of Florida phosphate beds, material considered economically unimportant at present, but which contains in addition to phosphate

"What Makes Fertilizer Move?" panel: O. E. Anderson, H. R. Dinges, Moderator H. H. Tucker and G. E. Smith.

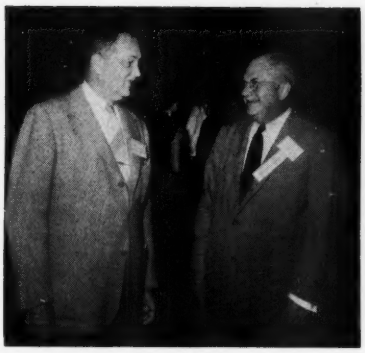


Granulation Panel: J. O. Hardesty, Moderator E. C. Kapusta, L. D. Yates, R. J. Engelhardt and W. W. Coffin.




DUVAL
High Grade Muriate
of Potash!
DUVAL SULPHUR and POTASH CO.
Modern New Plant and Refinery at Carlsbad, New Mexico
Address all communications to:
ASHCRAFT-WILKINSON CO.
Exclusive Distributors
ATLANTA, GEORGIA
Cable Address ASHCRAFT
NORFOLK, VA. • CHARLESTON, S. C. • TAMPA, FLA.
JACKSON, MISS. • COLUMBUS, OHIO

Hon. W. Sterling Cole, N. Y. congressman, addresses NFA convention.



D. N. Hauseman and William Caspari, Jr., Davison Chemical Co. division.

D. E. Lee, Tennessee Corp.; Silas Besthoff, Faesy & Besthoff; E. P. MacBryde, Jackson Grain Co. and L. J. Pettett, Tennessee Corporation.

Kinchen O'Keefe, Sou. Agr. Fert. Co.; Erol Beker, Istanbul; John B. Whitney, Chemical Const. Corp., and J. C. Mooar, Sturtevant Mill Company.

S. T. Keel, Int. Min. & Chem. Corp.; John E. Foy, Jr., Ashcraft Wilkinson; J. R. McCarty and Jim Cooksley, Int. Minerals & Chem. Corp.

and aluminum minerals, fluorine, uranium and rare earth minerals.

Cole stated that Blaw-Knox Co. has been paid $50,000 by the Atomic Energy Commission for an engineering study of a new process for obtaining both phosphates and uranium from the leached beds and also said that Aluminum Co. of America is reported working on the possibility of extracting alumina.

The New York Congressman discussed the first large scale atomic power plant being constructed by the Duquesne Light and Power Co. of Pittsburgh, Pa., in connection with the AEC. "Ten years from now," Cole stated, "electricity produced from atomic energy will be very much an economic reality."

Fertilizer Marketing

NFA's symposium on "What Makes Fertilizer Move?" was moderated by H. H. Tucker, Coke Oven Ammonia Research Bureau, with a panel including Dr. G. E. Smith, University of Missouri; O. E. Anderson, Ohio Bankers Association and H. R. Dinges, Spencer Chem. Co.

Dr. Smith pointed out that continued growth of the industry is "dependent on supplying farmers with those materials that are needed by individual fields and will regularly return a profit." He added that improper service and information have retarded the use of plant foods.

An encouraging sign, according to Smith, is that credit agencies see the need for fertilizer usage and "consider credit for proper plant nutrients a wise investment." He declared that optimum fertilizer usage will continue to be one of the most profitable farm practices, adding that it is possible on many crops to reduce production and increase profits through plant food usage.

Harold Dinges first stated that the single motivating force that makes farmers buy fertilizer is economic consideration. He pointed out that straight selling is only one part of the problem, that sales development must be considered and that this is a field in which the industry has done "a completely inadequate job."

Citing the great potentials of fertilizer consumption that could be attained through sales development, Dinges also mentioned other benefits such as fall application to help deemphasize the seasonal nature of the fertilizer business.

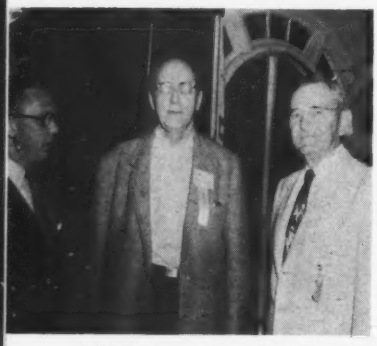
As a plan for individual company effort the director of product sales from Spencer Chemical Co. suggested that "every fertilizer manufacturer who has a sales organization on the road should plan a sales development program whereby each one of his salesmen will get at least five farmers per year to either use fertilizer on crops where they have used none before, or try increased rates above normal application on crops he has fertilized in the past."

Considering the possibilities of collective activity, Dinges discussed the possibility that one of the two major fertilizer associations might be the answer. As a starting program, he suggested research into the fall application of fertilizer on all economic crops.

Admit Credit Faults

Speaking as the banker representative on the panel, O. E. Anderson began by stating that the industry must admit its own faults in the field of credit before an overall solution is possible. He emphasized that to better the credit situation, every dealer should be encouraged to contact his local banker "frequently and consistently" well in advance of each sales season to provide him with a picture of prospective fertilizer movements, names of farmers who may require direct assistance and a general analysis of any possible trouble spots. Both the dealer and

LEFT: W. F. Price, Swift & Co.; Clyde T. Marshall and W. W. Jackson, Commercial Solvents Corp. RIGHT: Frank M. Feffer, Sr., and Frank M. Feffer, Jr., Arizona Fertilizers, Inc. and F. B. Porter, Tennessee Corporation.



LEFT: Jim Roe, "Successful Farming"; Maurice H. Lockwood, Int. Min. & Chem. Corp. and Weller Noble, Pacific Guano. RIGHT: Fred Neikirk, Central Chemical; W. L. Gay, Berkshire Chemicals; D. T. Fangmeyer, Mathieson.

LEFT: W. H. English, Jr., H. J. Baker; Charles Norville, Greenbrier; J. R. Rossman, Woodruff Fert. Works. RIGHT: N. G. Pierson, Albatros Super & Fert. Corp.; Dr. K. D. Jacob, USDA and A. H. Rowan, Albatros Super & Fert.

RIGHT: R. W. Goldthwaite, Lion Oil Co.; E. T. Spidle, Capital Fertilizer Co.; W. W. Belser, U. S. Steel Corp. RIGHT: J. A. Miller, Price Chemical Co.; B. E. Brown, Knoxville Fertilizer Co. and George Klein, Davison Chem.

the banker, said Anderson, should know enough about farming practices in their area to recognize whether the type of fertilizer purchased, the quantity and the cropping practices are apt to produce good results.

Fertilizer Granulation

Running concurrently with this discussion of fertilizer marketing was a workshop on fertilizer granulation moderated by NFA's E. C. Kapusta, with a panel including J. O. Hardesty, USDA; L. D. Yates, TVA; R. J. Englehardt, John J. Harte Co. and W. W. Coffin, Link-Belt Co.

Dr. Hardesty was the first to speak and provided an illustrated historical account of granulation processes. He related how the initial USDA research into granulation began in 1922 and was then related only to nitrogen materials. Later, in 1930, it was extended to superphosphates and super containing mixtures. Slides of early granulators and ammoniators were shown and, through two illustrations of European facilities, Hardesty showed that practically any size plant can be adapted to granulating processes.

W. W. Coffin described operation of the Martenet process which is based on an idea from S. J. Martenet, president, E. Rauh & Sons Fert. Co., and developed through a cooperative pilot plant study involving Martenet, the Rauh company and Link-Belt.

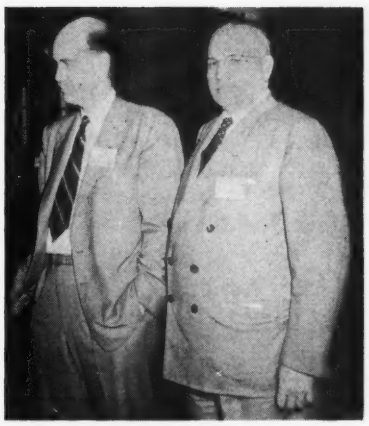
Coffin explained that Martenet's idea was that a high nitrogen, high analysis, non-hygroscopic fertilizer could be produced using only anhydrous ammonia and ammonium nitrate as nitrogen sources. He cited numerous advantages of the system and showed costs involved for plants of various capacity producing a 12-12-12 grade.

Success of the process was attributed to the material being placed in a slurry at the beginning of the operation. In discussions of low nitrogen goods, Coffin stated that 0-20-20 is being produced and that grades without superphosphate or without potash are also possible.

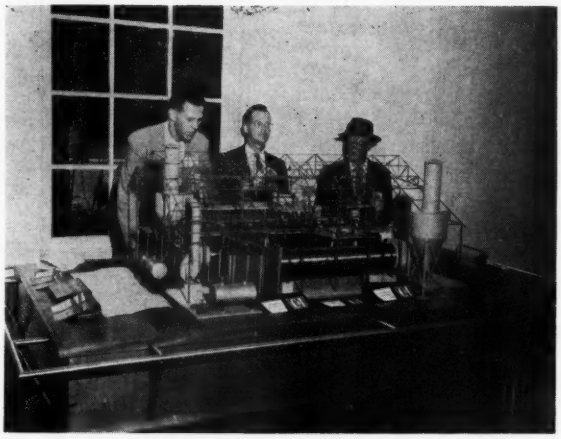
In discussing the commercial applications of granulation, R. J. Englehardt first explained the three main fertilizer granulating systems, describing the characteristics of

Gaines Boynton, Int. Min. & Chem., and Bob Robinson, Atlanta Utility.

V. H. Kadish, Milwaukee Sew. Comm. and Vernon Bishop, Lebanon Chem.



R. E. McAllister, Consol. M. & S., and R. E. Neidig, Balfour-Guthrie.



Win Barnes, Celanese Corporation; Baird Green, Jackson Fertilizer Co. and J. B. McConnaughey, Kentucky Fertilizer Works, stand around a working model of Chemical and Industrial Corporation's complex fertilizer plant.

Highway Equipment Co. exhibited a New Leader fert. & lime spreader. Shown with the unit is W. W. Kingman, sales manager. Insert shows new weighing device designed to simplify determination of application rates.

each. Summarizing their advantages, he said that types using the heat of chemical reaction to reduce moisture content of the granular material require the least amount of capital expenditures for conversion of existing facilities and have the lowest operating cost figures; the wet-dry system has the greatest flexibility; and slurry systems produce the lowest cost products. The latter methods usually have the highest operating costs and also require the most capital expenditure for conversion of existing facilities.

L. D. Yates discussed a joint USDA-TVA program and stated that TVA was beginning on the pilot plant stage of the job. He added that a drier is not being used at present, and that they are attempting to find a means of adapting low moisture contents.

He suggested that the use of steam is applicable where granulation of relatively cool materials is desired.

In his address as retiring NFA chairman, Louis Ware, International Minerals & Chem. Corp., stressed the importance of a good plan of organization and a capable staff in the operation of a trade association. Reviewing NFA activities, he emphasized that the program is a conservative, well-planned one, always in "good ethics and good taste."

Ware announced that over 100,000 copies of "Hunger Signs in Crops" have now been sold and that the project has been a self-liquidating one. The association is now preparing for publication of a new book, "The Care and Feeding of Garden Plants."

During his remarks, reference was made to consideration of a change in name for the association and it was suggested that "plant food" should be considered in a new title as a phrase that can be attractive to the public and beneficial to the organization.

New Directors

E. A. Geoghegan, vice president of Southern Cotton Oil Co., was elected chairman of the NFA board of directors, and C. T. Prindeville, vice president of Swift & Co., was named vice chairman.

R. L. Hockley was elected a director-at-large and new district directors include Bill Nichols, Edward J. Buhner, Edward R. Jones and B. H. Jones. Other board members whose terms had expired were reelected along with NFA officers Russell Coleman, W. R. Allstetter, and W. S. Ritnour.

At the close of the meeting it was announced that Weller Noble, the former head of Pacific Guano Co., and a long term NFA director, was elected to life membership in the association. ◆

Controlling the Green June Beetle Grub In Clover-Grass Pastures

By James R. Dogger
Assistant Professor of Entomology
North Carolina A&M College

The trend in recent years in the South has been toward production of more livestock. A natural consequence has been greater interest in pastures. Good quality clover-grass pastures are increasing in number each year in North Carolina. The value of Ladino clover in combination with fescue or orchard grass to farmers of the state is evident in its enthusiastic reception. Improved pastures, few and far between in 1945, covered over 800,000 acres in 1952.

Because such improved pastures represent an investment of considerable value, it is not surprising that insect damage to pastures attracts attention. Among the most common causes of this damage are green June beetle grubs.

These dingy-white grubs, which are more than two inches long when full-grown, have the unusual habit of crawling on their backs. Their activity in tunneling in the soil literally "tears up" the pasture. Damage is not caused so much by their feeding as it is by the holding down of new growth. They are especially hard on clover, uprooting old plants and preventing the vegetative spreading of clover.

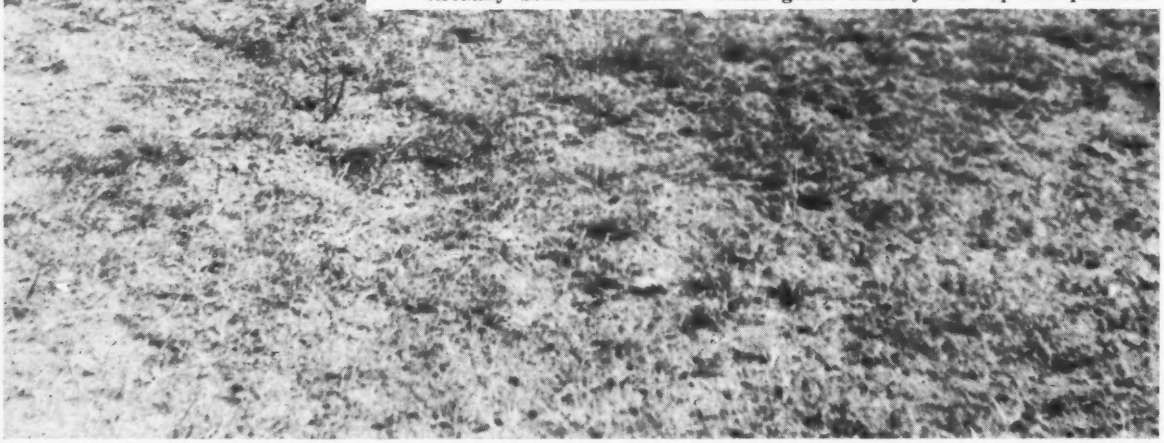
Control of these insects can be accomplished by the use of insecticides. In recent years, workers in Kentucky, Virginia and South Carolina as well as in North Carolina have turned their efforts toward finding a means of controlling the grubs which with a minimum of effort will result in quick relief for the pasture and will prevent future recurrence of the same problem.

Lead arsenate gives long term protection when applied at a pound or more per hundred square feet. This may be the answer for lawns or golf greens, but the volume required makes it questionable for pastures. The synthetic organic insecticides are available as alternatives which might be used at reasonably low rates of application.

Use of Parathion

Parathion is one of the most commonly used of these materials in North Carolina for green June beetle grub control. The grubs, which are generally killed within a

Ladino-fescue pasture damaged by green June beetle grubs. Clover has virtually been eliminated. These grubs literally tear up the pasture.



day or two after application, come to the surface to die and are easily seen.

Use of parathion or similar compounds has some disadvantages. Let's consider the way the grubs develop. The beetles are flying in June and July. Eggs are laid in the soil at this time and the grubs begin their destructive activities, which continue throughout the summer. It is usually late summer before the damage is noticed and fall before the decision is made to do something about it. By this time, of course, the damage is done. Killing the grubs brings satisfaction but small benefits. The grubs which are almost full grown are relatively inactive during the winter and rapid plant growth in the spring is affected little by the small amount of grub activity then.

In North Carolina's mountain counties, where the grubs sometimes cause additional damage in the spring, some real benefit might be gained by killing the grubs in the fall.

Parathion is relatively short lived. Studies in North Carolina showed that it may still be present in effective quantities in the soil 25 days after application if applied during the cooler months, but a month and a half later it is, for all practical purposes, gone.

Use of Chlordane

On the other hand, chlordane, another material used in North Carolina, persists in the soil much longer and may prevent damage to the field the following year. A disadvantage with chlordane is its slow action. It sometimes takes over a month before its full benefits are realized. Meanwhile some of the grubs continue their activity, while those that are killed die a few at a time, often in their burrows, and go unnoticed. For this reason, farmers are likely to judge this insecticide ineffective.

A mixture of these two or similar insecticides may be developed in which quick, spectacular kill is combined with long-term protection.

DDT, BHC and a number of other compounds have been or are being tested and may be recommended in other areas for control of the grubs.

Along with selection of an insecticide comes the problem of application. When should a man treat? The ideal time would be before seeding. The material could then be well distributed and worked into the soil. In actual practice this would seldom be done. Who knows whether his pasture will be attacked by grubs? If the field has been so badly injured that reseeding is necessary, then, of course, this method could be used.

In a good many cases, however, it is more practical to aim at recovery of the stand. Here the problem is not when, but how to treat. The object being to get the insecticide in the soil, any material that blows away or stays on the plants is either useless or actually a detriment.

Granulars Work Well

Granular formulations, in which the insecticide is applied on tiny pellets, do the job very well. The granules tend to roll off the plants and accumulate on the ground. They are not likely to blow away and do hold their "charge" of insecticide quite well until weathered into the soil.

Sprays are likely to give good coverage and penetration into the soil with little loss through drift. A disadvantage is that the plants are also treated. This raises the question of residue hazards to livestock.

Dusts reach both plants and soil, but there is always some loss through drift. Rain will generally wash most of the dust from the foliage to the soil. However, until it rains, the dusts will be exposed to rather rapid deterioration or loss in effectiveness.

Because of the complications of residue hazards encountered with sprays, granulars or dusts are preferred in North Carolina. If these are applied, when will the pasture be available? Livestock should be kept off at least a week, even though it may rain the day following application. Beyond that, if there are still visible signs of the insecticides in the field, it is advisable to keep them off until the material is no longer apparent. Actually this question often answers itself. The hazard of livestock poisoning or contaminated milk is usually gone from plant and soil long before the pasture has recovered to where it can be grazed.

This is only a brief review of the problem as it occurs in one state. Armed with some knowledge of the insect's habits and a good insecticide we can lick the grubs in our pastures—and make it pay. ◆

CSMA Meet Features Aerosol Product Survey

DELEGATES to the midyear meeting of the Chemical Specialties Manufacturers Association at the Netherland Plaza hotel, Cincinnati, on May 24–25, heard Melvin Fuld, CSMA president, predict a leveling off of current business adjustment when the Federal Reserve Board's production index reaches 120.

The head of Fuld Bros., Inc., said that he expected the index to remain at that level for four to five months, then rise after Labor day to 127 or 130 for the last quarter of 1954. This improvement, he

said, should be the first phase of a long-range resumption of steady growth.

Lower Distribution Costs

Fuld looks for a push toward reduction of distribution costs and outlined in detail the sales management factors that would contribute to this aim. He urged that companies not wait in planning production diversification, a procedure, he said, that must be an integral part of management thinking.

A trend in chemical advertising was noted by the speaker involving tie-in campaigns by prime producers with their major suppliers. He expressed the feeling that other portions of the chemical industry could take the lead of the aerosol group which, by steady promotion, in 1953, pushed sales up 45 per cent over the 1952 level.

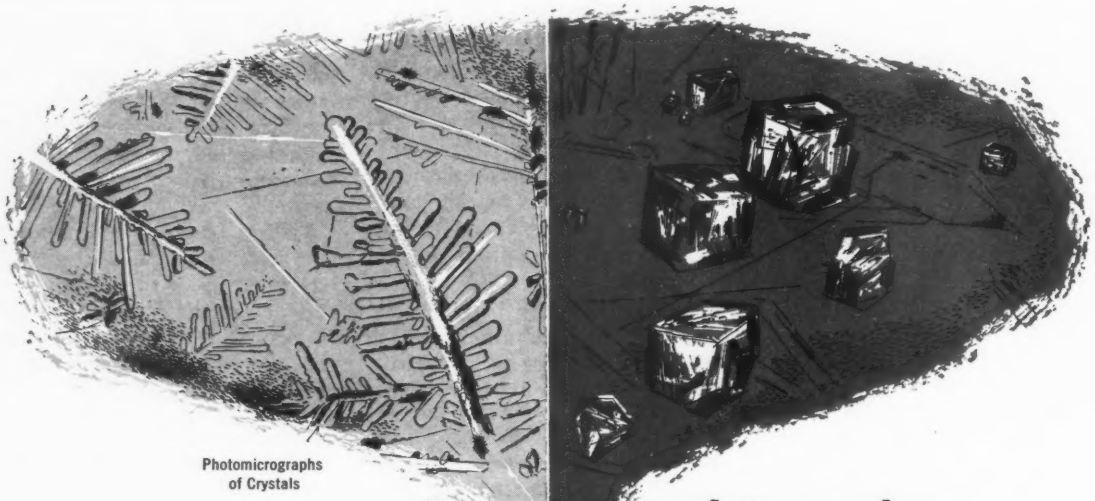
Fuld urged careful scrutiny of all sales expense items and was especially critical of the practice of devoting the major share of a sales training budget to novices at the expense of experienced, but older, salesmen who have never sold in a buyers' market. Men now forty, he pointed out, were only twenty-seven when there last was a buyers' market, and although 80 per cent of the industry's sales force is experienced, they do need sharpening up.

Aerosol Product Survey

A report on the third annual Aerosol Product survey highlighted the meeting with figures showing a 45 per cent increase in 1953. The aerosol industry, according to CSMA, can now boast of approximately a $150 million retail aerosol business. Insecticides increased approximately 11 million units of all types over the 1952 figures.

Dr. Frank Princi, University of Cincinnati, presented a paper on DDT toxicity in which he reviewed briefly the research and investigative work which has been carried out with DDT. He also evaluated the relative hazards of the material according to present data.

In a talk on filth in raw agricultural products, Walter W. Dykstra, Fish & Wildlife Service, emphasized the need for better production of raw materials during all



Photomicrographs of Crystals

How URANA* solutions reduce caking and secondary bag set

Arcadian

PRODUCTS FOR PROFITABLE FARMING

Nitrogen Solutions (Nitrana® and Urana*)

AMERICAN Nitrate of Soda

A-N-L® Nitrogen Fertilizer

Urea Products

Sulphate of Ammonia

The usual mixed fertilizers contain ammonium chloride salts resulting from reaction of ammonium salts with potassium chloride. These fern-like or needle-shaped crystals tend to bind together, causing caking of the fertilizer at the factory and in the bag.

When URANA 15 (15% Urea) or URANA 9 (9.25% Urea) Solution is used in ammoniation, the urea makes the ammonium chloride form cube-like crystals, with much less binding effect. This means less caking and set, better fertilizer condition, and often a reduction in costs.

This is only one of several advantages obtained from ammoniating with URANA Solutions. For other important aids developed through Nitrogen Division research, consult one of our technical servicemen. Their help is free to our customers.

*Trade-Mark

NITROGEN DIVISION Allied Chemical & Dye Corporation

New York 6, N. Y. • Richmond 19, Va. • Ironton, Ohio • Hopewell, Va. • Atlanta 3, Ga. • Columbia 1, S. C. • Omaha, Neb. • San Francisco 3, Calif.

stages of handling and processing, particularly on farms.

Dykstra stated that one rat voids about 70 droppings and 16 cc of urine each day and, since they live on, in or near food material, agricultural commodities are frequently contaminated in some manner. He made this point in stressing the quantities of filth which can be produced by small infestations of rats and mice within a short period of time.

He said that although much of this contamination is caused by rats, a great deal more is due to mice. Several million pounds of rodent-contaminated foods are seized each year, according to Dykstra, but a much greater amount is undetected and eventually consumed by humans. ◆

New Insecticide from Carbide & Carbon Chem. Co.

Cyclethrin

A NEW insecticide, cyclethrin, has been announced by Carbide and Carbon Chemicals Co. The safe, effective, pyrethrins-like material was described in a paper before the CSMA Insecticide division by C&C researchers Dr. Harry L. Haynes, Howard R. Guest and Dr. Harry A. Stansbury.

Cyclethrin is more highly synergized than allethrin by pyrethrins synergists for rapid knockdown and kill of house flies. The complex molecule [3-(2-cyclopentenyl) 2-methyl-4-oxo-2-cyclopentenyl chrysanthemummonocarboxylate] was synthesized in Carbide's South Charleston, W. Va., research labs and was evaluated against insect pests at the Boyce Thompson Institute.

It has been prepared in the laboratory with a purity of 95 per cent. Mammalian toxicity tests by Dr. C. P. Carpenter et al, Mellon Institute, Pittsburgh, have shown that toxicity is of the same nature as, and no greater than that of allethrin and pyrethrins. It is considerably less toxic by some routes.

Tests have shown that cyclethrin in oil space sprays and in low pressure aerosols is synergized by pyrethrins synergists to a greater degree than allethrin. When piperonyl butoxide and sulfoxide are used at the same concentrations as with pyrethrins, 1.6–1.7 times the amount of cyclethrin as pyrethrins is needed to provide excellent Grade AA space sprays.

Two times as much allethrin and two times as much piperonyl butoxide are required to equal the pyrethrins sprays. In aerosols containing synergists with no DDT, 1.8 times as much cyclethrin and 3.7–5.0 times the quantity of allethrin is needed to equal pyrethrins. When DDT is added to such mixtures, the knockdown and kill of houseflies is improved so it equals that of cyclethrin.

Sulfoxide and piperonyol butoxide synergize cyclethrin in oil sprays better than allethrin for knockdown of German roaches. Cyclethrin plus sulfoxide provides superior kill when compared with similar allethrin mixtures.

Synergized cyclethrin shows considerable promise for control of biting flies attacking dairy cows when used in oil space-repellent type mixtures, in water based sprays and in treadle sprayer concentrates.

Results for two seasons of testing in five states indicate that 1.6–1.7 times the dosage of synergized cyclethrin is needed as compared with synergized pyrethrins for control of horn, house, stable and horse flies. ◆

Dedicate Rutgers Institute

Waksman Heads New Unit

ON JUNE 7, the Rutgers Institute of Microbiology was formally dedicated at New Brunswick, N. J. The four story, red brick structure was erected and equipped at a total cost of $3,050,000 through a grant by the Rutgers Research and Endowment Foundation, of funds derived from streptomycin royalties.

The primary function of the Institute, directed by Dr. Selman A. Waksman, will be to treat microbiology as a fundamental science, and the staff will investigate microorganisms from the standpoint of occurrence and classification, physiology and biochemistry and will probe the relationships between microbes and higher forms of life. Other divisions will examine practical applications as suggested by the fundamental studies.

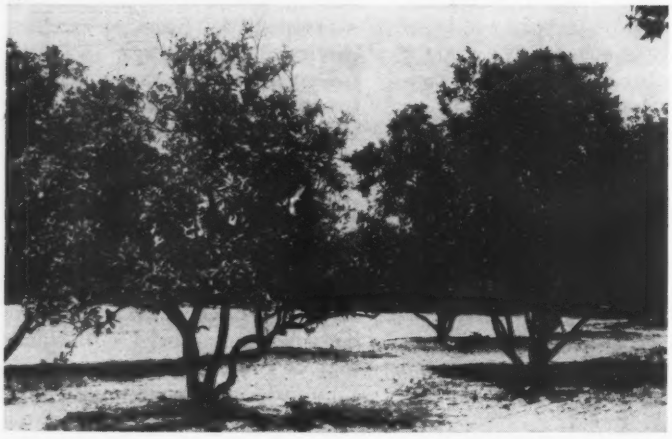
In the field of agriculture, work will be done on the importance of microbes in soil fertility and spoilage of crops and harvested foods.

Dr. Waksman, who with students and associates has isolated a number of antibiotics including streptomycin and neomycin, is director of the institute with a staff of bacteriologists, mycologists, virologists, physiologists, biochemists and organic chemists assisted by laboratory and administrative assistants.

Lewis Webster Jones, Rutgers president, gave the dedicatory address as part of a special three day program which included a symposium on "Perspectives and Horizons in Microbiology" featuring authorities from this country and Europe. Other activities for guests attending the ceremonies were trips through the plants of E. R. Squibb & Sons, New Brunswick, and Merck & Co., Rahway, N. J. A buffet supper sponsored by Chas Pfizer & Co. was held on the evening of June 8. ◆

Vermiculite-Carried Chelates

Latest Treatment For Iron Chlorosis



Orange tree at left was left untreated, while vermiculite-carried iron chelates were applied to soil around tree at right. Within 6 weeks, once white and yellowish leaves of treated tree were green.

VERMICULITE-carried iron chelates are proving to be excellent materials for treatment of iron deficiency in plants, according to Zonolite Co., Chicago. Zonolite, producer of vermiculite, adds the carrier and does the packaging for chelates made by Bersworth Chemical Co., Framingham, Mass.

The chelates have solved several problems previously connected with correction of iron deficiencies by providing stable iron complexes easily applied over large areas by conventional spreader methods.

As first produced and tested in Florida citrus groves, the chelates were fine, dry, extremely hygroscopic powders and, when applied by conventional spreader methods to the soil, they produced a fine dust which settled on leaves and fruit causing burns. Once in the soil they were easily leached.

Vermiculite was chosen as a carrier because it absorbs up to its own weight of low viscosity liquids while remaining free-flowing. These absorptive qualities are due to a multicellular structure and the resultant surface area of 10.35 square meters per gram.

The chelate, in solution, is sprayed onto and absorbed by the vermiculite (about (22/70 mesh) which is then passed through a rotary drier. Processing and packaging is done at Travelers Rest, S. C., mine and plant.

A greenish-brown, granular material is produced, composed of uniform, sand-like, dustless and noncaking particles. It can be used without further mixing or combined with fertilizers. No special precautions such as the wearing of masks need be taken. ◆

Citrus tree leaves treated with iron chelate (left) are green again in 6 weeks while those from untreated iron deficient tree stay mottled white.

Naugatuck's 50th Year

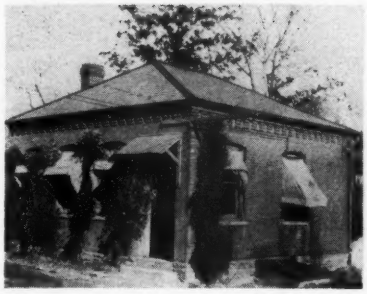
Division Growth Now Fastest in History

LAST month Naugatuck Chemical division, U. S. Rubber Co., celebrated its 50th anniversary and, as John E. Caskey, vice president and general manager of the division, stated at a special press conference, Naugatuck is now growing at a faster pace than ever before in its history.

Caskey stated that with new production facilities soon to be completed and a number of new products scheduled to enter production, there is a good chance that the division will increase its sales volume 25 per cent by 1956.

Naugatuck's Growth

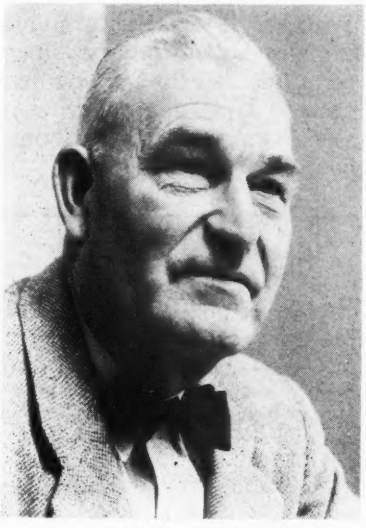
Naugatuck began in 1904 as a small plant producing sulfuric acid



When Naugatuck Chem. Div., U. S. Rubber Co., was formed in 1904 general offices were housed in this building.

for rubber reclaiming and brass production and now makes more than 300 products including rubber chemicals, farm chemicals, rubber latex, plastics, synthetic rubber and TNT. It is the largest domestic producer of rubber chemicals and the third largest of vinyl resins.

It was during the depression that the division branched out into aromatics and farm chemicals. Through research based on the re-



John E. Caskey

examination of thousands of organic compounds which had previously been developed as possible runner chemicals came the well known fungicides Spergon and Phygon and an insecticide called Syntone.

This research has expanded until the company now has a special laboratory at Bethany, Conn., with a full staff of pesticide specialists. Maleic hydrazide, the plant growth retardant, was developed by Naugatuck researchers along with the popular acaricide, Aramite.

The current expansion program will bring the total yearly Naugatuck production capacity to over 600 million pounds of chemical products. Included in the program is construction of additional farm chemical production facilities at the Naugatuck, Conn., plant.

Sixteen New Products

According to Caskey, Naugatuck has 16 new products that will move from the laboratory into production this year including farm chemicals, vinyl plastics, polyester resins and other materials.

Naugatuck executives, in addition to Caskey, include: George R. Vila, assistant general manager; Robert E. Casey, general sales manager; Harold M. Parsekian, assistant general sales manager; William H. MacHale, advertising manager; Christy H. Madsen, production manager; D. Loren Schoene, assistant director, research & development; Clayton F. Ruebensaal, commercial development manager; Joseph P. Monahan, general control manager and Russell S. Tobias, division purchasing agent.

Have you these Insecticide production problems?

- *Increasing per hour production*
- *Improving product quality*
- *Reducing labor costs*

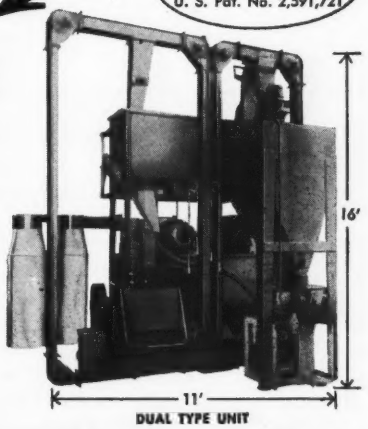
Solve them with R.T.R.* UNI-BLENDER Compounding Plants

*RTR Ready-to-Run U. S. Pat. No. 2,591,721

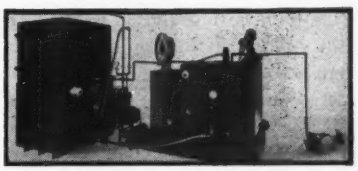
These complete, compact Ready-to-Run units provide maximum production per hour—uniform quality products—at minimum labor and other operation costs.

The Dual type plant elevates, mixes, pulverizes, blends, and packages dust concentrates and also field strength dusts, including those involving liquid impregnation. Jacketed mixers if specified.

Stock models now available in 40, 56, 70 and 100 cu. ft. mixer capacities. Other compounding and liquid formulating plants engineered to your specifications.



DUAL TYPE UNIT



RTR Uni-Blender Liquid Formulating Plants liquefy and blend toxicants used in production of liquid concentrates and liquid sprays.

Write for technical bulletins

POULSEN COMPANY

Engineers and manufacturers of materials processing and materials handling equipment

5957 WEST THIRD STREET, LOS ANGELES 36, CALIFORNIA

TVA Continuous Ammoniator

For Superphosphates and Fertilizer Mixtures

By L. D. Yates, F. T. Nielsson,[1] and G. C. Hicks
Tennessee Valley Authority
Wilson Dam, Alabama

Abstract

A continuous ammoniator of simple design was developed for use in the production of fertilizers. With it, large proportions of neutralizing ammonia can be incorporated in superphosphate and fertilizer mixtures without excessive losses of either ammonia or P_2O_5 availability. The ammoniator consists of a rotating cylinder of approximately equal diameter and length with retaining rings at each end and without flights. The ammoniating medium is introduced through a multiple-outlet slit-type distributor under the rolling bed of solids. Air is blown through the ammoniator to remove water vapor. The ammoniator has been used successfully with standard nitrogen solutions and with liquid and gaseous anhydrous ammonia.

In a pilot-plant ammoniator, from six to seven pounds of neutralizing ammonia per unit of available P_2O_5 in the feed was incorporated in a mixture of ordinary superphosphate and muriate of potash. Nominal 6–12–12 and 8–12–12 fertilizers were produced using standard nitrogen solutions as ammoniating media. Using anhydrous ammonia about 4.5 pounds of neutralizing ammonia per unit of available P_2O_5 in the feed was incorporated in electric-furnace concentrated superphosphate.

The rolling bed promotes the formation of granules when favorable conditions exist in the ammoniator. Through the introduction of sulfuric acid under the bed, granular 10–10–10 fertilizer based on ordinary superphosphate and granular 10–20–20 fertilizer based on concentrated superphosphate were made with nitrogen solutions as the only sources of nitrogen.

PART I

Ammoniation of superphosphate and of fertilizer mixtures containing superphosphate is practiced widely in this country. Ammoniation is economically attractive, and it usually increases the concentration of plant food in the product and improves physical condition. Anhydrous ammonia and nitrogen solutions, which contain ammonia along with ammonium nitrate or urea, are the cheapest and most concentrated forms of fertilizer nitrogen that are available to fertilizer manufacturers.

When ammonia reacts with superphosphate, the heat of reaction that is liberated drives off moisture and the materials formed usually do not cake excessively in storage or cause the fertilizer bags to deteriorate. In general, the larger the proportion of ammonia added the greater the extent to which the economic advantage and the advantage of concentration can be realized.

The equations for the principal reactions that accompany the ammoniation of superphosphates have been given by Keenen (*4*) and by White, Hardesty and Ross (*9*) as follows:

$$H_3PO_4 + NH_3 \longrightarrow NH_4H_2PO_4 \quad (1)$$

$$Ca(H_2PO_4)_2 + NH_3 \longrightarrow NH_4H_2PO_4 + CaHPO_4 \quad (2)$$

$CaSO_4$ Absent

$$NH_4H_2PO_4 \text{ (from reactions 1 and 2)} + NH_3 \longrightarrow (NH_4)_2HPO_4 \quad (3)$$

$$3CaHPO_4 \text{ (from reaction 2)} + 2NH_3 \longrightarrow (NH_4)_2HPO_4 + Ca_3(PO_4)_2 \quad (4)$$

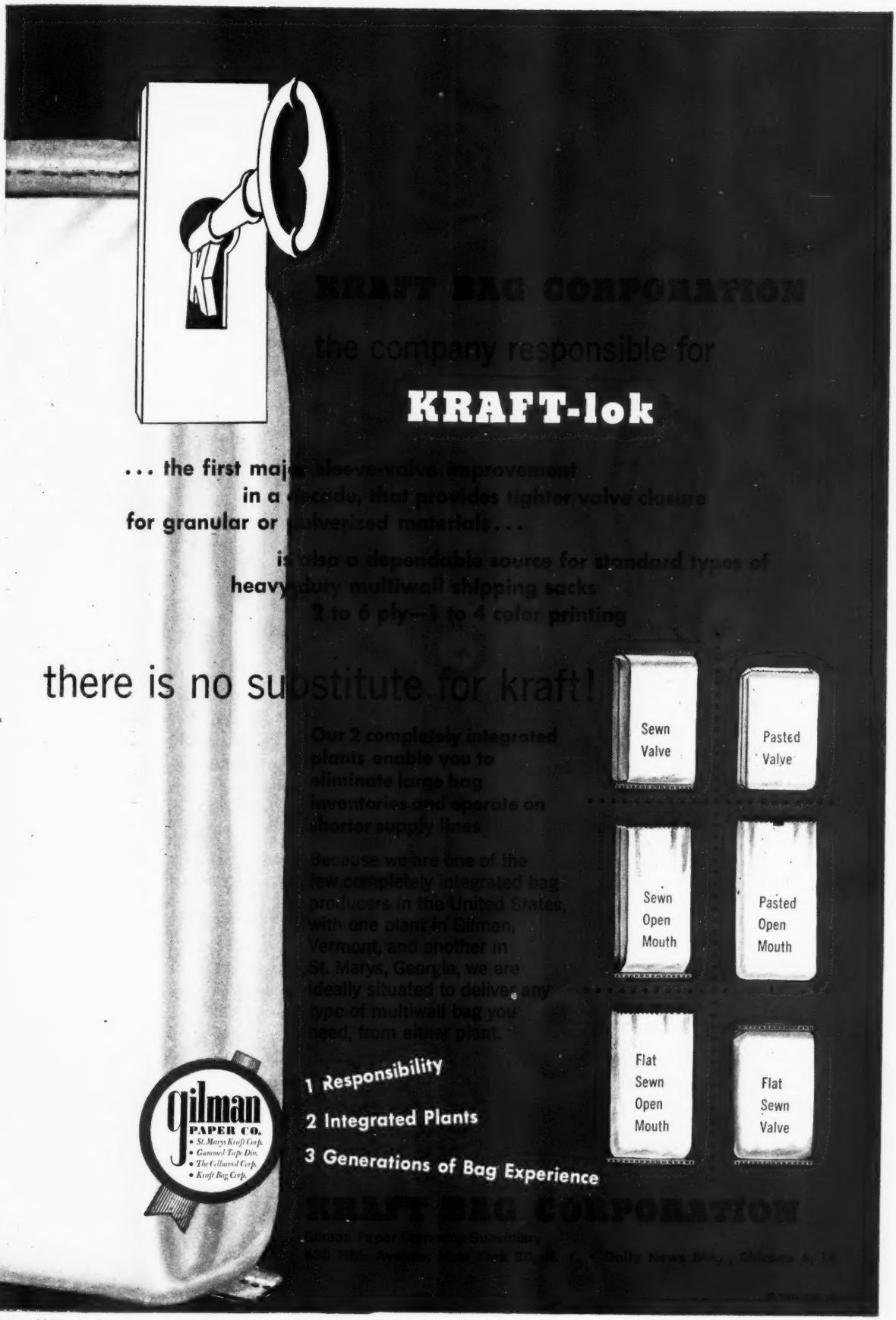
$CaSO_4$ Present

$$2CaHPO_4 \text{ (from reaction 2)} + 2NH_3 + CaSO_4 \longrightarrow Ca_3(PO_4)_2 + (NH_4)_2SO_4 \quad (5)$$

$$NH_4H_2PO_4 \text{ (from reactions 1 and 2)} + NH_3 + CaSO_4 \longrightarrow CaHPO_4 + (NH_4)_2SO_4 \quad (6)$$

$$2CaHPO_4 \text{ (from reaction 6)} + 2NH_3 + CaSO_4 \longrightarrow Ca_3(PO_4)_2 + NH_4SO_4 \quad (7)$$

[1] *Present address: F. S. Royster Guano Co., Norfolk, Va.*


KRAFT BAG CORPORATION
the company responsible for
KRAFT-lok
... the first maj sleeve-valve improvement
in a decade, that provides tighter valve closure
for granular or ulverized materials...
is also a dependable source for standard types of
heavy duty multiwall shipping sacks
2 to 6 ply—1 to 4 color printing
there is no substitute for kraft!
Our 2 completely integrated plants enable you to eliminate large bag inventories and operate on shorter supply lines
Because we are one of the few completely integrated bag producers in the United States, with one plant in Gilman, Vermont, and another in St. Marys, Georgia, we are ideally situated to deliver any type of multiwall bag you need, from either plant.
Sewn Valve
Pasted Valve
Sewn Open Mouth
Pasted Open Mouth
Flat Sewn Open Mouth
Flat Sewn Valve
1 Responsibility
2 Integrated Plants
3 Generations of Bag Experience
Gilman PAPER CO.
• St. Marys Kraft Corp.
• Gummed Tape Div.
• The Gilman Corp.
• Kraft Bag Corp.
KRAFT BAG CORPORATION

PESTMASTER* TECHNICAL GRADE DDT is preferred by manufacturers of quality insecticides because of properties that make it easy to work. The unusual hardness of Pestmaster* brand simplifies the grinding, and its uniform cleanliness contributes to ease of handling. Its quality is unexcelled.

MICHIGAN CHEMICAL TECHNICAL GRADE DDT is distributed in the United States and possessions by Wyandotte Chemicals Corporation, Wyandotte, Michigan, and may be ordered through them in any quantities, with the usual fast delivery enjoyed through Michigan Chemical Corporation.

PESTMASTER* 75% AND 50% DDT WETTABLE POWDER AND DUST CONCENTRATES. The wettable formulations have quick wetting properties, and are intimately and uniformly blended with the carrier. Their unusual quality is in their excellent suspension properties. They remain uniformly in suspension. The 75% Wettable powder is made to World Health Organization specifications, and *has been especially designed to withstand severe tropical conditions of use and storage.*

PESTMASTER* 25% DDT EMULSION. Here is a 25% emulsion with low phytotoxic qualities that reduces to a minimum the danger of burning foliage when used properly, and emulsifies in water of any degree of hardness. It emulsifies quickly and meets all quality standards.

Michigan Chemical Corporation also manufactures other chemicals used in agricultural products. Among them are:

Magnesium Carbonate — Methyl Bromide
Magnesium Oxide — Soil Fumigant

Write for complete information without obligation.

MC

MICHIGAN CHEMICAL CORPORATION Saint Louis, Michigan

EASTERN SALES OFFICE: 230 Park Avenue, New York 17, New York

*T. M. REG. U. S. PAT. OFF.

QUALITY PRODUCER OF PESTMASTER* DDT AND METHYL BROMIDE AND OTHER AGRICULTURAL CHEMICALS

The equations are arranged to show the order in which the reactions are believed to occur. Phosphoric acid and monocalcium phosphate, both of which are water soluble, are the principal phosphatic constituents of superphosphate. Calcium sulfate is present in ordinary superphosphate and is present to a limited extent in concentrated superphosphate made with wet-process phosphoric acid, but it is virtually absent from concentrated superphosphate made with electric-furnace phosphoric acid.

Table I shows the degree of ammoniation, expressed in terms of pounds of neutralizing ammonia per unit of available P_2O_5 in the superphosphate, when calculated to correspond to the principal ammoniation reactions (equations 1 to 7) of typical superphosphates. The calculations are based only on the water-soluble phosphates, and a small amount of additional ammonia may be involved in reactions with the citrate-soluble-water-insoluble phosphates which have been thought to consist of complex compounds such as $Ca[H_2Fe(PO_4)_2]_2 .6H_2O$ (7). The calculations indicate that the theoretical degrees of ammoniation with ordinary and concentrated superphosphates, respectively, are about nine and six pounds of neutralizing ammonia per unit of available P_2O_5.

Most of the commercial plants use batch-type ammoniators, although some continuous units are now in use. Until recently, the degrees of ammoniation practiced in most plants seldom was much greater than indicated by equations 1 and 2. However, there is a trend now toward the use of higher degrees of ammoniation. Those who have not advanced in that respect are eager to do so in order to realize the potential benefits.

A review of the general practice of ammoniation and of the equipment and procedures in common use suggested that the full potential economical benefits might be approached more closely through the development of improved equipment and operating methods. The present paper describes pilot-plant studies of the ammoniation of superphosphates and the development of a continuous ammoniator with which relatively high degrees of ammoniation readily can be obtained.

Ammoniator Development

Work was concentrated on the development of a continuous ammoniator because continuous processing frequently is more economical than batch processing, and in this particular case it was believed that a continuous machine would be superior to a batch machine for the following reasons: In a continuous machine, ammoniation would proceed at all times; thus, there would be no loss of time in charg-

Table I. Calculated Stoichiometric Degree of Ammoniation of Superphosphates

	Pounds of neutralizing NH_3 per unit of available P_2O_5 in superphosphate					
			Typical concentrated superphosphates produced using acid made by the			
	Typical ordinary superphosphate[a]		Electric-furnace process[b]		Wet process[c]	
Reaction No.	Increment	Summation	Increment	Summation	Increment	Summation
1	0.5	0.5	0.1	0.1	0.3	0.3
2	1.9	2.4	2.1	2.2	2.0	2.3
5	–	–	–	–	0.4	2.7
3	–	–	2.3	4.5	2.3	5.0
4	–	–	1.4	5.9	1.0	6.0
5	1.9	4.3	–	–	–	–
6	2.4	6.7	–	–	–	–
7	2.4	9.1	–	–	–	–

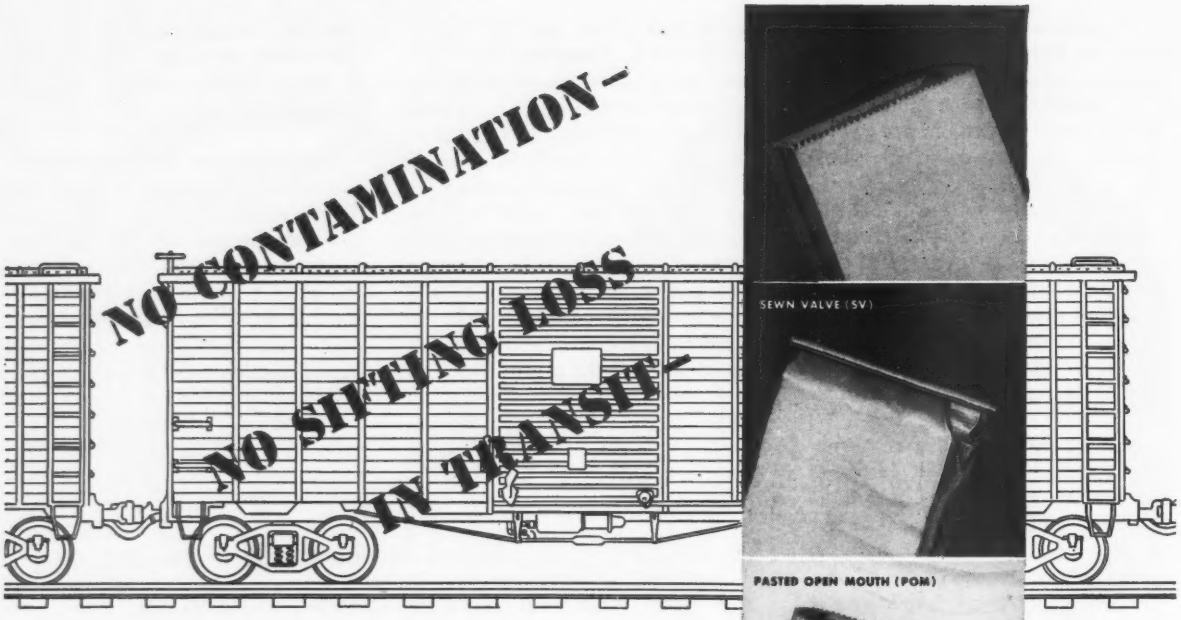
[a] Assumed composition, %: total P_2O_5, 20.5; C.I. P_2O_5, 0.5; water-soluble P_2O_5, 18.0; free acid as P_2O_5, 2.0.
[b] Assumed composition, %: total P_2O_5, 48.8; C.I. P_2O_5, 1.5; water-soluble P_2O_5, 43.1; free acid as P_2O_5, 1.1.
[c] Assumed composition, %: total P_2O_5, 49.5; C.I. P_2O_5, 1.8; water-soluble P_2O_5, 42.4; free acid as P_2O_5, 2.9; SO_3, 2.0.

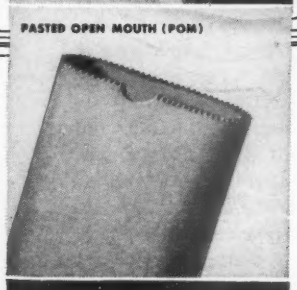
Table II. Typical Analyses of Raw Materials Used in Ammoniation Tests

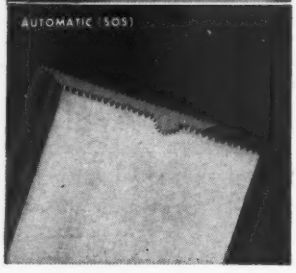
	SOLIDS Composition, %					Screen analysis, % (U.S. sieve sizes)							
	P_2O_5												
Raw material	Total	C.I.	Water soluble	H_2O[a]	K_2O	+4	−4 +6	−6 +35	−35 +100	−100
Concentrated superphosphate	49.6	1.3	42.5	2.8	—	0.1	3.4	49.3	43.9	3.3
Ordinary superphosphate	20.2	0.6	17.8	5.9	—	0.1	1.7	45.5	43.0	9.7
Muriate of potash	—	—	—	0.1	61.1	0.4	3.0	41.0	44.2	11.4

	NITROGEN SOLUTION							
	Composition, %			Designation of suppliers of nitrogen solutions				
Authors' designation for solutions	NH_4NO_3	NH_3	H_2O	Nitrogen Division (Allied)	Lion	Spencer Chemical Company	Commercial Solvents	Phillips
X	65.0	21.7	13.3	2A	1	A	CSC 101	1
Y	55.5	26.0	18.5	3	2	B	CSC 102	2
Z	66.8	16.0	16.6	4	3	C	CSC 103	3

[a] Determined by drying overnight in a vacuum desiccator.







when you bag in

BAGPAK

Multiwalls

Bagpak Multiwalls assure constant, perfect protection against loss and contamination in transit and storage. Bagpak offers five basic types of Multiwall Bags for proper packing and shipping of every type of commodity:

- *Cushion Stitch Open Mouth (CSOM)*
- *Sewn Valve (SV)*
- *Pasted Valve (PV)*
- *Pasted Open Mouth (POM)*
- *Automatic (SOS)*

Bagpak Multiwalls are saving time and money, piling up profits for manufacturers the country over.

To find out how Bagpak Multiwalls can paint a better profit picture places you under no obligation.

Just write:

Dept. FC-21, Bagpak Division, 220 E. 42 St., New York 17

International Paper COMPANY

BAGPAK DIVISION

BRANCH OFFICES: Atlanta · Baltimore · Baxter Springs, Kansas · Boston · Chicago · Cleveland · Dallas · Denver · Detroit · Kansas City, Kansas · Los Angeles · Louisville · Minneapolis · New Orleans · Philadelphia · Pittsburgh · St. Louis · San Francisco · IN CANADA: The Continental Paper Products, Ltd., Montreal, Ottawa, Toronto

ing and discharging, and more effective use would be made of the space in the ammoniator. Also, through the use of a continuous instead of a batch machine, many of the errors that inhere in manually controlled high-speed operation of batch equipment might be avoided.

The early phases of the work were restricted to the studies of the ammoniation of electric-furnace concentrated superphosphate through use of gaseous ammonia, because these materials are manufactured at the TVA plant. Studies that were made later were concerned with the ammoniation through the use of nitrogen solutions of fertilizer mixtures that contained either ordinary or concentrated superphosphate and the ammoniation of concentrated superphosphate with anhydrous liquid ammonia. Table II shows typical chemical and screen analyses of the raw materials used in the tests.

In all the tests, the loss of ammonia during ammoniation was determined as follows: The gas from the ammoniator was pulled through a fume hood and measured, and a measured sample of this gas was drawn through a series of absorbers containing sulfuric acid. The excess acid was titrated with alkali solution. Thirty-minute sampling periods were used. Losses of ammonia as determined by this method agreed with losses as determined by material balances based on NH_3:P_2O_5 ratios.

Concentrated Superphosphate and Gaseous NH_3

In an attempt to react concentrated superphosphate with ammonia gas in a covered screw-type mixer having interrupted flights, a stiff paste was formed in which ammonia was absorbed very slowly. About 3.9 pounds of neutralizing ammonia per unit of available P_2O_5 in the superphosphate was absorbed in 45 minutes, and ammonia losses were very high. The product had the appearance of mud balls, and it became very hard when it cooled. The kneading action of the screw blades apparently had destroyed the cellular structure of the superphosphate and had materially reduced the absorbing surface. It appeared that much of this difficulty might be overcome by introducing the ammonia under a rolling bed of superphosphate particles of which were not subjected to kneading.

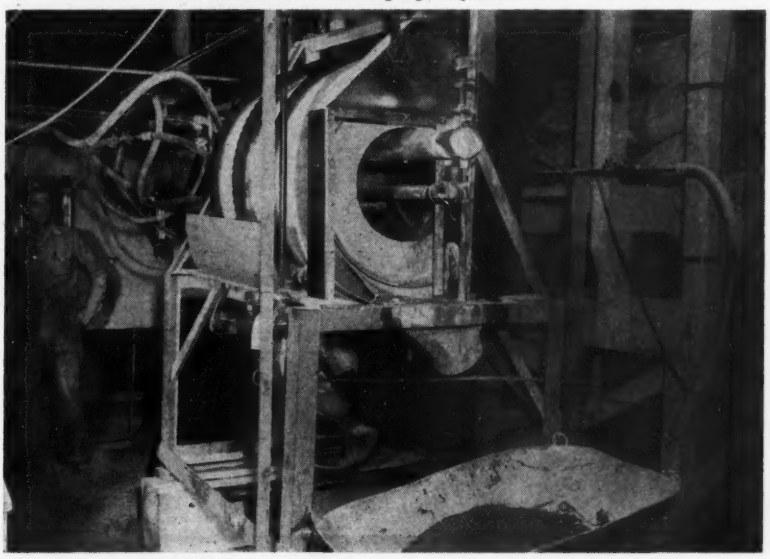
Application of this theory through the use of a bench-scale Roto-Louvre drier that had been designed for introducing gases under a rolling bed of solids gave very promising results. As much as 5.35 pounds of ammonia per unit of available P_2O_5 in the feed was absorbed in 20 minutes. However, loss of ammonia through the gas seal and between the louvers was excessive and, rather than trying to eliminate loss from this equipment, it was more expedient to construct and test an ammoniator of a simpler design.

1.5- by 7-Foot Cylinder

This ammoniator, the forerunner of the one used in most of the work, consisted of a rotating cylinder, 1.5 feet in diameter by 7 feet long, which was fitted with a slit-type ammonia distributor. A retaining ring in the discharge end maintained a 3-inch bed of superphosphate in the ammoniator; the depth of the bed over the ammonia distributor was 2 inches. The distributor was 6 feet long; it consisted of six 1-foot sections each having an 11- by 1/32-inch slit opening and separate feed pipes. The amount of ammonia that passed through each pipe was measured. The ammoniator usually was operated at 38 r.p.m. The superphosphate was fed continuously through the ammoniator, and the time of retention of the superphosphate was controlled by feed rate. During the tests, air was blown over the bed in the ammoniator; the amount of air was 0.08 pound per pound of superphosphate.

The results of tests in the 1.5- by 7-foot ammoniator are shown in Table III. In these tests, concentrated superphosphate that had been made with electric-furnace phosphoric acid was ammoniated with gaseous ammonia. With a retention time of 12 minutes and with about two thirds of the ammonia entering through the first half of the ammoniator or through the second, third and fourth sections, about 4.0 to 4.6 pounds of ammonia per unit of P_2O_5 could be fed without excessive loss of ammonia (arbitrarily assumed to be four per cent). Increasing the retention time to 22 minutes increased the degree of ammoniation obtained to about 5 pounds per unit of available P_2O_5 in the feed without significant loss of ammonia. Retention of these proportions of ammonia corresponds approximately to the completion of reaction 3. When larger proportions of the ammonia were introduced at the feed or discharge ends of the ammoniator, there was a significant loss of ammonia even when the input was as low as 3 pounds per unit of available P_2O_5. The addition of water as a spray

TVA's continuous ammoniator for superphosphates and fertilizer mixtures.



Presenting

THE MOST MODERN BAG PRINTER

Manufactured in

One, Two, Three and Four Colors for printing made up bags of Paper, Cotton and Burlap, new or used.

Let us send you complete information with descriptive literature.

SCHMUTZ
MFG. CO.
18th and Main Streets
Zone 3
Louisville, Ky.

Cable Address "SCHMUTZ"—Long Distance Phone CLAY 7771

and blowing air over the bed reduced the temperature somewhat and reduced loss of ammonia slightly. The amount of water used was just under that which would cause excessive balling and caking.

For comparison, concentrated superphosphate was ammoniated with gaseous ammonia in a 1-ton commercial batch-type ammoniator. Even when the time of ammoniation was as long as 90 minutes, the addition of 3.5 pounds of ammonia per unit of P_2O_5 in the feed resulted in the loss of 10 per cent of this ammonia. The concentrated superphosphate became wet and formed large balls in the batch ammoniator, whereas it had remained granular and free flowing in the continuous ammoniator probably because the air that was blown over the bed removed some moisture from the surface of the particles and from the walls and scraper of the ammoniator.

Immediate loss of P_2O_5 availability in the tests in the 1.5- by 7-foot continuous ammoniator varied with degree of ammoniation approximately as is shown in Figure 1. Samples for analyses were taken directly from the ammoniator discharge and cooled. By comparing the analyses of these samples with those of the feed the loss of availability during ammoniation was determined.

The temperature of the product as discharged from the ammoniator ranged from 186° to 289° F.; however, the temperature could not be correlated with degree of ammoniation. The water solubility of the P_2O_5 varied with degree of ammoniation as shown in Figure 2. The solid curve is for concentrated superphosphate ammoniated with gaseous ammonia. The other curve was derived from calculations based on the equations for the ammoniation reactions. The shape of the experimental curve agrees very well with the theoretical curve and

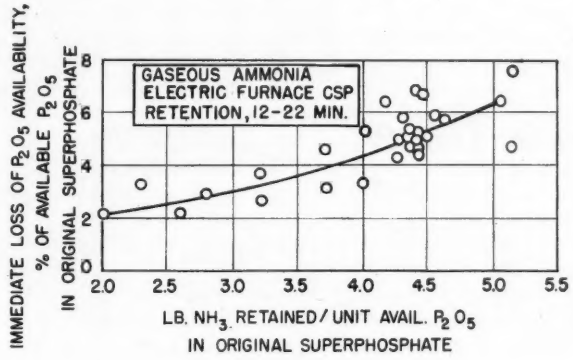


FIGURE 1

EFFECT OF DEGREE OF AMMONIATION OF CONCENTRATED SUPERPHOSPHATE ON IMMEDIATE LOSS OF P_2O_5 AVAILABILITY

Table III. Continuous Ammoniation of Concentrated Superphosphate[a] with Gaseous Ammonia

(1.5—by 7-foot ammoniator[b])

Time in min. superphosphate retained in ammoniator	Distribution of NH_3 to the six sections of the distributor, % of total NH_3	Spray water added, lb./lb. superphosphate	NH_3 fed, lb./unit[b] of avail. P_2O_5 in superphosphate	NH_3 retained, lb./unit[c] of avail. P_2O_5 in superphosphate	Ammoniated product composition, %			Losses, %	
					N	Avail. P_2O_5	H_2O	NH_3	P_2O_5 availability[d]
12	13–19–28–19–13–8	0	4.30	4.30	7.8	42.4	0.04	0	4.9
12	13–19–28–19–13–8	0	4.30	4.00	7.3	42.4	0.4	7	5.3
12	13–19–28–19–13–8	0	4.35	4.35	7.9	41.8	0.5	0	4.7
12	13–19–28–19–13–8	0	4.85	4.33	7.9	42.7	0.3	11	5.3
12	13–19–28–19–13–8	0.052	4.15	4.15	7.6	42.5	2.0	0	6.4
12	13–19–28–19–13–8	0.057	4.50	4.40	8.0	42.8	1.7	2	5.3
12	13–19–28–19–13–8	0.052	4.60	4.40	7.9	42.1	1.0	4	5.0
12	13–19–28–19–13–8	0.052	4.60	4.45	8.1	42.5	0.5	3	4.6
12	13–19–28–19–13–8	0.046	4.65	4.65	8.4	41.6	0.5	0	5.7
12	22–22–22–12–11–11	0	4.75	4.30	7.8	42.6	0.1	10	5.8
12	22–22–22–12–11–11	0	4.80	4.35	7.9	42.7	0.3	9	4.7
12	22–22–22–12–11–11	0	5.10	4.26	7.7	41.9	0.5	16	4.3
12	22–22–22–12–11–11	0.052	4.50	4.37	8.0	41.9	0.2	3	5.5
12	22–22–22–12–11–11	0.035	4.61	4.42	8.0	42.9	0.9	4	4.5
12	22–22–22–12–11–11	0.052	4.65	4.26	7.7	41.8	1.9	8	5.0
12	22–22–22–12–11–11	0.048	4.70	4.50	8.2	42.3	1.3	4	5.1
12	4–4–11–18–26–37	0	2.80	2.6	4.9	44.9	1.9	7	2.2
12	37–26–18–11–4–4	0	3.34	3.2	6.0	44.4	0.9	4	2.7
22	13–19–28–19–13–8	0	4.40	4.40	8.0	41.0	0.2	0	6.9
22	13–19–28–19–13–8	0	5.05	4.53	8.2	41.8	0.1	10	5.9
22	13–19–28–19–13–8	0.054	4.45	4.45	8.1	41.6	2.0	0	6.7
22	13–19–28–19–13–8	0.054	5.05	5.05	9.1	41.1	0.6	0	6.3
22	13–19–28–19–13–8	0.055	5.15	5.15	9.3	42.0	0.4	0	4.7
22	13–19–28–19–13–8	0.054	5.50	5.15	9.3	40.9	0.6	6	7.6

[a] For chemical analysis of electric-furnace concentrated superphosphate typical of those used in these tests see Table I.
[b] Depth of bed above distributor, 2 inches.
[c] A unit, 20 lb. available P_2O_5 in ordinary superphosphate.
[d] Immediate loss of P_2O_5 availability determined by analyzing superphosphate before and immediately after ammoniation.

EVER MEET

face-to-face?

BORON-HUNGRY CROPS NEED

TRONABOR*

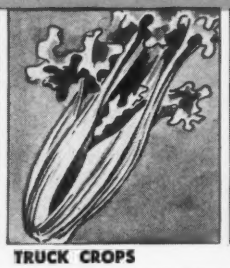
(Agricultural Pentahydrate Borax)

You're looking at Boron-hungry Alfalfa, typical of many important crops which require more adequate supplies of Boron than they can get from the soil. Such crops need TRONABOR—a low cost source of Boron produced specifically for the needs of Agriculture. TRONABOR is a granular free-flowing product containing a guaranteed minimum of 44% B_2O_3 corresponding to 13.7% Boron and 121% equivalent Borax. It is packaged in 100 pound bags and is easy to apply either in dry or liquid form. Boron-deficient crops cost you money! Your small investment in TRONABOR will pay off in bigger yields, more marketable crops, more profit for you at the market. Investigate this economical and effective source of Boron for soil application, today.

MORE MONEY PER YIELD WITH TRONABOR

ALFALFA

TRONABOR provides greater Alfalfa yield per acre. Better quality hay. Prevents "Yellow-top," puny, stunted leaves. Plants grow lush and strong.



TRUCK CROPS

TRONABOR produces better yield, more marketable produce. Prevents cracked stems in Celery, unsightly black spots in Table Beets, hollow stems and darkened heads in Cauliflower.

TREE FRUIT

There's more money in TRONABOR-FED apples at harvest time. Fruit grow large and firm. TRONABOR prevents pitting of the surface, results in better grading.

TRONA INDUSTRIAL AND AGRICULTURAL CHEMICALS — ESTON CHEMICALS

See your local fertilizer dealer for information on TRONABOR, or write American Potash & Chemical Corporation, one of the world's principal producers of Boron derivatives.

*Trade Mark Registered

American Potash & Chemical Corporation

Offices • 3030 West Sixth Street, Los Angeles 54, California • 122 East 42nd St., New York 17, New York
ESTON CHEMICALS DIVISION 3100 East 26th Street, Los Angeles 23, California

Plants • Trona and Los Angeles, California

with the data obtained by Kumagai, Rapp and Hardesty (*6*).

3- by 3-Foot Cylinder

Further studies of continuous ammoniation were carried out in the 3- by 3-foot ammoniator shown in Figures 3 and 4. This ammoniator was built primarily to test the effect of depth of bed above the distributor on absorption of ammonia.

The 3- by 3-foot ammoniator consisted of a rotating cylinder which was pitched 1 inch per foot and usually was operated at a speed of 9 to 10 r.p.m. through means of a chain connected to a variable-speed drive. As seen in Figure 4, there were no flights in the ammoniator, a scraper bar of 2-inch angle iron was provided for cleaning the inside of the cylinder and a slit-type distributor was provided for introducing ammonia or nitrogen solution under the rolling bed of material to be ammoniated. The depth of the bed above the distributor was controlled by means of retaining rings at the ends of the cylinder. Provision was made for blowing air through the ammoniator to remove moisture evolved in the reaction and to control agglomeration. The feasibility of removing moisture by blowing air through the ammoniator is believed to be one of the important advantages of this type of ammoniator. Usually only a small amount of air is required.

In the first series of tests in this ammoniator a distributor with a feeder pipe for each of the six sections was used during ammoniation of a 9-inch bed of concentrated superphosphate with gaseous ammonia. This distributor which was similar to the one employed in the 1½- by 7-foot ammoniator was placed 7 inches below the surface of the bed. However. it was observed that the use of so many feeder pipes and the deeper bed in the present ammoniator resulted in channeling and some ammonia escaped. As a result, losses of ammonia were somewhat greater at comparable degrees of ammoniation and retention times than those experienced in the 1½- by 7-foot ammoniator. Therefore, the distributor was redesigned as shown in Figure 5.

The new distributor, which was 33 inches long, had six sections, each about 5 inches long, which were formed by welding two flat pieces of stainless steel to a ½-inch stainless steel tube and welding dividers in the V-shaped chamber thus formed. The slit at the apex of the V was 1/32 inch wide. A hole was drilled in the tube in each section, and the opening directly in front of each hole was closed; in this way the ammoniating medium was prevented from jetting into the bed of superphosphate and, instead, was distributed evenly to the bed.

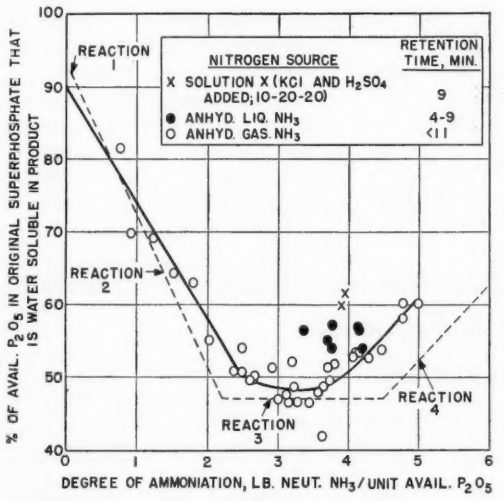

% OF AVAIL. P_2O_5 IN ORIGINAL SUPERPHOSPHATE THAT IS WATER SOLUBLE IN PRODUCT
DEGREE OF AMMONIATION, LB. NEUT. NH_3/UNIT AVAIL. P_2O_5
NITROGEN SOURCE
RETENTION TIME, MIN.
X SOLUTION X (KCl AND H_2SO_4 ADDED; 10-20-20) 9
● ANHYD. LIQ. NH_3 4-9
○ ANHYD. GAS. NH_3 <1
REACTION 1
REACTION 2
REACTION 3
REACTION 4

FIGURE 2
EFFECT OF DEGREE OF AMMONIATION ON WATER SOLUBILITY OF P_2O_5 IN CONCENTRATED SUPERPHOSPHATE

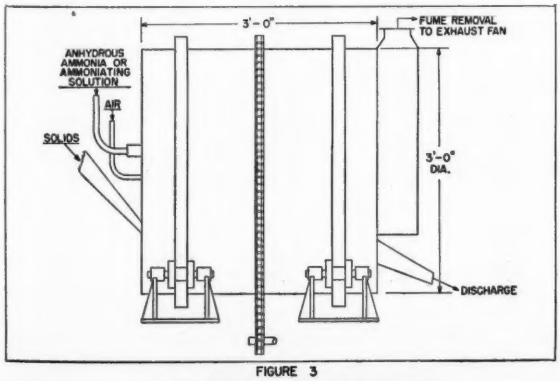


FIGURE 3
VIEW OF EXTERIOR OF CONTINUOUS AMMONIATOR

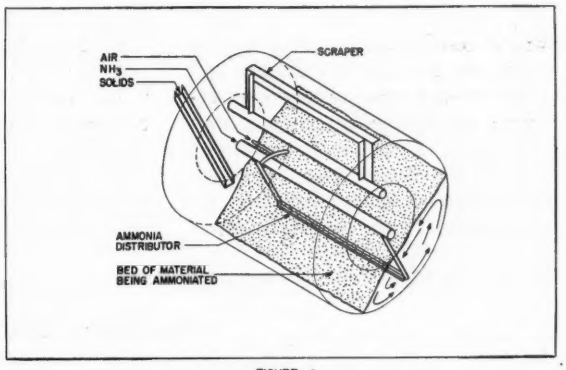


FIGURE 4
PICTORIAL VIEW OF CONTINUOUS AMMONIATOR

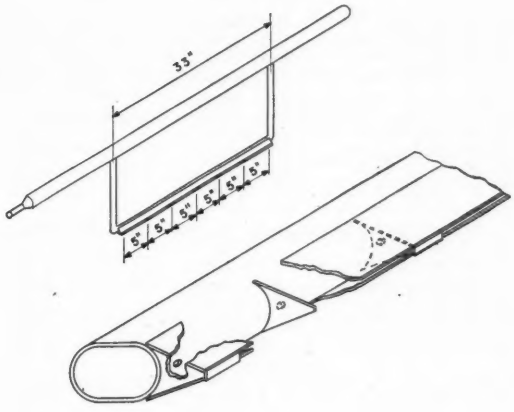


FIGURE 5
DETAILS OF CONSTRUCTION OF AMMONIA DISTRIBUTOR

The ammoniating medium entered the distributor through the supporting pipe and flowed to both ends; the proportion to each section was controlled by the size of the hole in that section. This distributor was used in further studies of ammoniating concentrated superphosphate with gaseous ammonia and with liquid ammonia and ammoniating mixtures containing ordinary or concentrated superphosphate with nitrogen solutions.

In a second series of tests made using concentrated superphosphate and gaseous ammonia and the new distributor mounted 7 inches beneath the surface of the bed, ammonia losses were somewhat higher at comparable degrees of ammoniation and equal retention times than they were in the 1½- by 7-foot ammoniator where the distributor was only 2 inches below the surface of the bed.

There was some indication that the rate of ammonia addition per unit length of distributor which was much higher in the new ammoniator than in the older one had a more important effect on ammonia absorption in the tests than bed depth. However, in work that will be mentioned later in which mixtures containing ordinary superphosphate and nitrogen solutions were used, increasing the rate of ammonia addition per unit length of distributor fivefold affected ammonia absorption only slightly. Further work is needed to clarify these findings.

Concentrated Superphosphate & Liquid NH_3

The 3- by 3-foot ammoniator and the distributor shown in Figure 5 were used in ammoniating concentrated superphosphate with anhydrous liquid ammonia. The depth of the bed above the ammoniator was 7 inches. The rates of feed of superphosphate were 1, 1.5 and 2.0 tons per hour; in the tests at the 1.5- and 2.0-ton rates, 25 per cent of recycle was used. The retention times for these rates were 9.3, 4.9 and 3.7 minutes, respectively.

The proportion of ammonia that was added was varied so as to detect the practical limit of absorption at each superphosphate feed rate. The distribution of the ammonia was varied in the tests at the 1.5-ton feed rate. Water could not be added as with gaseous ammonia because it caused excessive balling and caking of the superphosphate. Even without the addition of water and with 16 pounds of air per 100 pounds of superphosphate being blown on the bed, excessive balling occurred at feed rates above 1 ton per hour. Recycling of about 25 per cent of product that had been cooled by handling to about 185° F. prevented balling.

The data of Table IV show that when the retention time was 4.9 minutes or less as much as 4.3 pounds of neutralizing ammonia per unit of available P_2O_5 could be fed to the system without loss of more than four per cent of the ammonia. Introducing most of the ammonia at the mid-point of the ammoniator gave better results than distributing it evenly over the entire length. The immediate losses of available P_2O_5 agreed fairly well with those shown in Figure 1 for tests with gaseous ammonia and concentrated superphosphate.

Losses of P_2O_5 availability that would be expected in storage in piles were determined in oven tests and are reported later. The percentage of the P_2O_5 in a water-soluble form was somewhat higher than when gaseous ammonia was used (Figure 2); the reason for this difference is not known. The products of ammoniation with liquid or gaseous ammonia usually were granular and, in most tests, 75 to 90 per cent of the product was minus 4 plus 35 mesh in size.

(*To be concluded in August*)

Table IV. Continuous Ammoniation of Concentrated Superphosphate[a] with Anhydrous Liquid Ammonia

(3- by 3-foot ammoniator[b])

Distribution of NH_3 to the six sections of the distributor, % of total NH_3	NH_3 fed, lb./unit[c] of avail. P_2O_5 in superphosphate	NH_3 retained, lb./unit[c] of avail. P_2O_5 in superphosphate	Ammoniated product composition, %			Losses, %	
			N	Avail. P_2O_5	H_2O	NH_3	P_2O_5 availability[d]
Retention Time, 9.3 Minutes—1 Ton/Hr. Superphosphate							
13–19–28–19–13–8	3.73	3.60	6.8	42.5	2.8	1	3.6
13–19–28–19–13–8	4.22	4.22	7.9	43.6	2.2	0	5.1
13–19–28–19–13–8	4.76	4.18	7.8	44.2	2.9	12	3.5
13–19–28–19–13–8	5.00	4.40	8.0	44.0	1.6	12	3.9
Retention Time, 4.9 Minutes—1.5 Tons/Hr. Superphosphate[e]							
13–19–28–19–13–8	3.65	3.65	6.9	44.5	2.3	0	4.0
13–19–28–19–13–8	4.30	4.11	7.7	43.8	2.7	4	4.5
13–19–28–19–13–8	4.78	4.19	7.9	43.6	3.2	12	5.1
16–16–17–17–17–17	3.56	3.50	6.7	43.8	3.8	2	4.3
16–16–17–17–17–17	4.30	3.86	7.3	44.3	3.1	10	4.6
16–16–17–17–17–17	4.72	4.10	7.7	43.5	3.2	13	5.3
Retention Time, 3.7 Minutes—2 Tons/Hr. Superphosphate[e]							
13–19–28–19–13–8	3.55	3.35	6.3	43.2	3.0	6	4.4
13–19–28–19–13–8	4.18	3.80	7.0	43.1	2.7	9	4.5
13–19–28–19–13–8	4.65	4.15	7.7	42.7	2.4	11	4.6

[a] For chemical analysis of electric-furnace concentrated superphosphate typical of those used in these tests see Table I.
[b] Distributor shown in Figure 5; depth of bed over distributor, 7 in.
[c] A unit, 20 lb. available P_2O_5 in original superphosphate.
[d] Immediate loss of P_2O_5 availability determined by analyzing superphosphate before and after ammoniation.
[e] 25% of product recycled to ammoniator.

Cotton Diseases in the West

By Philip J. Leyendecker
Head, Dept. of Agric'l. Services
New Mexico College of A & MA

IF I SAID that I had been authorized by the Secretary of Agriculture to inform you that cotton allotments in the five Western states represented here (Ed. Note: New Mexico, Arizona, Texas, California and Oklahoma) were to be reduced by an additional 360,000 acres, I imagine that such a statement would cause considerable alarm. Actually, though, cotton diseases will wipe out production on that much cotton acreage in those five Western states in 1954. This is a much larger acreage than that allotted to the entire state of New Mexico this year. So cotton diseases must be halved if we are to gear our production to the high level necessary on those acres that have been allotted to cotton in the West.

Root Rot Was First

The first disease of cotton was found in Texas in 1888. It was discovered by L. H. Pammel, a young pathologist, who identified the disease as root rot. Today, this disease is commonly known as cotton root rot, and since its discovery, has cost the cotton farmers of the West many thousands of dollars annually. Root rot is caused by a soil-borne fungus which attacks well over 2,000 different species of plants. Last year this disease alone accounted for a loss of 18,000 bales in the West.

Since 1888, many other diseases of cotton have been described which annually account for extensive losses across the Cotton Belt from California to Georgia. For instance, in 1953 cotton diseases accounted for a 13.5 per cent reduction from full yield, or a loss of 2,500,000 bales, worth approximately $5,000,000 (at $200 a bale).

In the five western states represented at this conference, cotton diseases reduced yields by 725,000 bales, valued at $1,450,000. Even in our day of inflation, this represents a sizable sum.

The figures which will be quoted throughout this presentation were taken from the 1953 report submitted to the Cotton Disease Council by the standing committee on cotton disease losses. Loss estimates were submitted to the subcommittee by 47 cotton research and extension workers stationed across the cotton belt.

A similar report was also prepared in 1952, the results of which reflect similar trends to those found in 1953. All compiled figures in the report are estimates and should be considered as such.

According to the preceding report, five of the six major cotton diseases occur in the West. Of the six, Fusarium wilt is the only major cotton disease not present in our area. This disease alone accounted for a loss of 256,000 bales in the southern cotton growing states. The number one disease in the irrigated West is Verticillium wilt. Last year this disease reduced full yields by eight per cent or 300,000 bales.

Since its discovery in California in 1928 Verticillium wilt has been increasing in distribution and severity until now it is the most important disease of cotton in the West. This is especially true in California and Arizona where cotton culture has been extended into the cooler regions of their cotton growing areas.

Speech delivered before the Southwest Five States Cotton Growers Association in Phoenix, Ariz., April, 1954.

Verticillium Wilt

A recent report from Arizona indicated that Verticillium wilt is spreading and increasing in severity at a very rapid pace. This may be partially explained by the lack of rotation with other crops, such as small grains and legumes. Besides, the standard Acala strains of American Upland cotton are very susceptible to Verticillium wilt. The lack of rotation also allows for the rapid build-up of the wilt organism in the soil, because it has been shown at the New Mexico station that the wilt fungus is spread primarily by the cutting and plowing-under of dead diseased stalks.

In California, wilt reduced full yields last year by 13 per cent—about a quarter of a million bales. These losses probably would have been much greater if it hadn't been for the recent release of 442 W.R. by the California station. This variety possesses a very high degree of tolerance to the wilt disease.

As I indicated earlier, Verticillium wilt is not a newcomer to the cotton culture of the West. It has been responsible for ever increasing losses in this area since the early 30's. The state of New Mexico attributes a cash loss of between $500,000 and $1,000,000 each year to the ravages of wilt. Losses are equally severe in Region 6 of Texas. Joint Federal and state effort in the past decade has resulted in the discovery of a number of cultural practices which are very beneficial in alleviating damage caused by the wilt organism. In

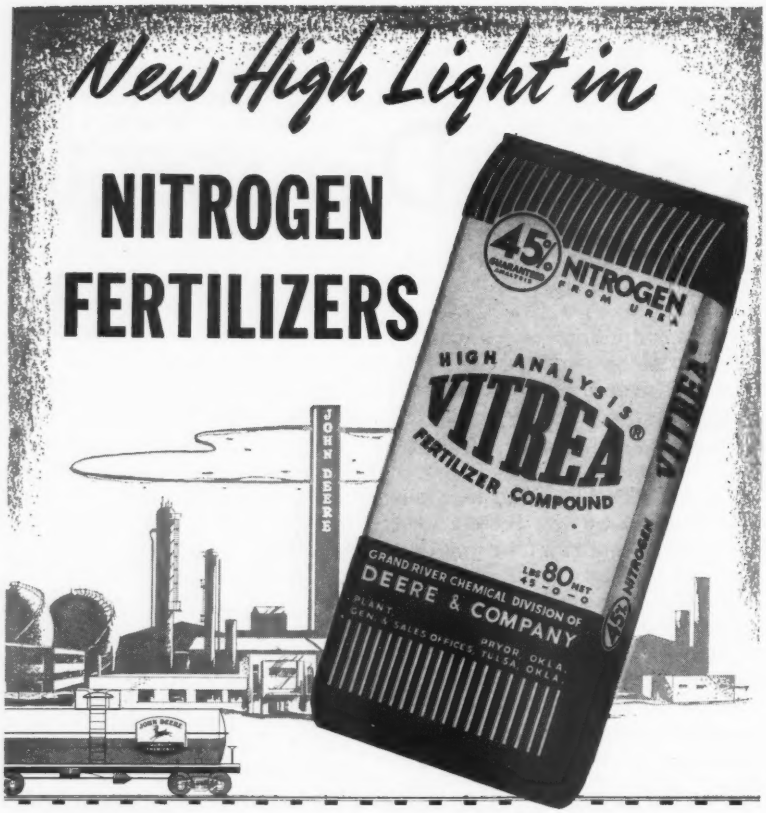
addition, considerable tolerance to the disease has been isolated and is now being incorporated into high-quality fibered Acala lines which, when released, will further reduce yield losses.

Indications are that Verticillium wilt can be satisfactorily controlled by a combination of cultural practices which will bring out the full expression of the tolerance which can be incorporated into the Acala varieties. Because the wilt organism cannot be eliminated from our agricultural soils, continuous cotton culture will only add to its spread and buildup. So the cotton farmer of the West will have to learn how to produce cotton profitably on infested land *despite the disease.*

Root Knot

Following Verticillium wilt in amount of damage done to cotton in the West is a comparatively little-known disease caused by microscopic eel worms, called nematodes, which inhabit the sandier soils of the West. The disease is known as root knot because of the small galls produced on the cotton roots as a result of the feeding of the worms. In 1953 the root knot nematode was responsible for a reduction in yield of 75,000 bales of cotton.

This disease has been responsible for considerable damage over the years, but because of the lack of trained specialists in this field of pathology, root knot has not received the attention given other diseases of cotton. Within the last few years, however, considerable exploratory and practicable work has been done in controlling the root knot nematode. There are available commercially a number of soil fumigants or nematocides which, if applied as prescribed by the manufacturer, will adequately control the disease—although these materials must be applied annually to obtain economic control. If fields moderately infested with the root knot nematode are planted to other crops in 1954, care should be taken to avoid highly susceptible crops which will build up the nematode populations and cause severe damage when these fields are planted to cotton again. From all evidence at hand, it appears that the root knot nematode will al-



VITREA . . . A New High Analysis 45% Nitrogen Fertilizer..From Urea

This new "all purpose" nitrogen fertilizer can be used on all crops . . .

- ***EASILY APPLIED BY ANY METHOD***
  . . . drilling . . . top or side dressing . . . plowing down . . . broadcasting . . . airplane . . . or in irrigation systems
- ***EXTRA HIGH NITROGEN CONTENT - 45%***
- ***PRILLED INTO A BEAD-LIKE SHAPE***
- ***SPECIALLY CONDITIONED***
  . . . non-caking and free flowing
- ***COMPLETELY SOLUBLE***
- ***RESISTANT TO LEACHING***
- ***CONVENIENT 80 lb. BAGS***

For your nitrogen needs look to the company famous for quality products for use in agriculture since 1837.

VITREA® 45% NITROGEN

Grand River Chemical Division of

DEERE & COMPANY

GEN. & SALES OFFICES – TULSA, OKLA. • PLANT – PRYOR, OKLA.

ways be a potential threat to the economic production of cotton on sandier soils in the West.

Seedling diseases create another problem of equal importance for the cotton producer in the West. More than half of the failures to obtain a full stand of cotton are due to seedling diseases. To some degree, damage to cotton seedlings has been reduced by the application of fungicides to the seed. This practice has solved the problem of certain seedling diseases which are carried on the seed coat. Seed treatment has also improved the vigor and emergence of cotton seedlings under adverse conditions. However, in the West the problem of obtaining uniform stands has not been completely solved by applying chemicals to the seed. Our agricultural soils are infested with a number of pathogenic organisms which cannot be adequately controlled by the application of fungicides on the seed. This does not imply that seed treatment is not effective. Seed treatment was designed to destroy pathogenic organisms on the seed and give protection to the young seedling during germination. This has been accomplished. Our problem is to afford additional protection to the young seedlings following emergence and production of the first true leaves. This period is very critical in the establishment of uniform stands in the West. A thin covering of a fungicide over the seed cannot be expected to afford this type of protection.

The importance of obtaining stands in the West is established by the fact that last year we lost 40,000 bales to seedling diseases. This is a conservative figure, as we didn't experience an extremely cool spring in 1953. The preceding loss estimate does not include the cost of replanting and loss of efficiency in mechanical harvesting due to poor stands.

New Approaches

Many new approaches are being undertaken at present by commercial companies in cooperation with state and Federal agencies to solve our particular problem here in the West.

One of these is the "in-the-furrow" application of fungicides at planting time. This method of increasing seedling protection from soil pathogens looks very promising. The fungicides can be applied either as a dust or spray at very low cost by certain simple tractor modifications and planter adjustments.

Even with these newer approaches, we are a long way from perfecting a practicable method of controlling seedling diseases. The time is at hand for cotton pathologists in the West to focus their attention upon seedling diseases, because if this problem is not solved, it will be a serious threat to the mechanization of the cotton industry. We must not forget that for the most effective use of all mechanized equipment the number and spacing of plants in the row must be as uniform as possible.

Bacterial Blight

Another disease of cotton which is capable of causing considerable damage to cotton fiber and reducing yields is bacterial blight or angular leaf spot. At present this disease is chiefly confined to Arizona, New Mexico and Texas. Last year, blight accounted for a loss of approximately 42,000 bales, not including loss in grade due to staining, etc. Blight may be carried inside acid-delinted seed. Therefore, the possibility of transplanting the disease from one area of the West to another is not too remote, and once established, the disease is chiefly spread by driving rain and irrigation water. Even in our area, where rainfall is limited, the disease has been known to cause considerable damage when overhead sprinkler systems have been used.

It has been recently shown that under arid conditions the disease, when established, can over-winter in the field on infected cotton debris. Bacterial blight should therefore be considered as a potential threat to cotton production in the West.

As for control, resistance to the disease has been found and is being incorporated into most of the commercial lines of Acala cotton. Release of resistant varieties in the West is now being planned by Federal and state agencies.

Root Rot Today

Cotton root rot, the disease which Pammel described in 1888, is still taking its annual toll. More time and money has probably been spent studying this disease than on all other cotton diseases. Most of the early work was done in Arizona at the Sacaton station by Dr. C. J. King and his associates, followed by the work of Dr. R. B. Streets at the University of Arizona. Methods of control have been suggested; yet in 1953 root rot caused a reduction in yield of 30,000 bales in the West. The disease doesn't appear to be spreading or increasing in severity, but where it occurs, it causes severe damage unless certain cultural practices are followed. Many cotton fields in Arizona last year suffered 35 to 50 per cent reductions in yield because of root rot.

Control measures include rotation with alfalfa, use of winter legumes where practicable, deep plowing and the maintenance of a high level of soil nutrients through chemical fertilizers. Root rot will always be a problem in certain areas of the West, but losses can be held to a minimum by following these practices.

Black Root Rot

This discussion of the cotton disease situation in the West would not be complete without a brief mention of black root rot. It was first discovered by King and Presley about 20 years ago at Sacaton, Ariz.

The disease was not heard of again until 1951, when it was rediscovered in New Mexico and Region 6 of Texas. A survey conducted in 1952–53 showed that it was quite prevalent and causing considerable damage in the two states. The disease organism attacks both seedling and mature cotton plants, causing a reduction in stands and yield of seed cotton. Pima strains seem to be more susceptible to the disease than the Acala varieties; however, seedling losses have been noted in the Acala cottons. Black root rot is under close observation, and it doesn't appear to be an immediate threat to cotton production in New Mexico and Region 6 in Texas.

These are the disease problems currently facing us in the West. How successful you are in controlling them is the key to your overall production. ◆

Salisbury Coop Plant Triples Fert Output

By Dick Brown

The same number of men today are turning out three times as much fertilizer as they did a year ago at the Cooperative Fertilizer Service plant in Salisbury, N. C., thanks mainly to a recently installed network of conveyor belts and elevators.

Production at the plant, a subsidiary of Farmers Cooperative Exchange, is expected to total 20,000 tons this year as compared with a maximum 6,500 tons prior to the face lifting job.

B. A. Weddington, plant superintendent, waxes enthusiastic, every time he explains the improvements and the advantages the renovation has brought. "By remodeling the interior of the plant and adding new machinery and storage bins we have been able to increase production, cut labor costs and speed up the overall operation considerably.

Conveyor System Is Key

"The key to the whole thing," he continued, "is the conveyor belt system which enables us to move materials and fertilizer in a hurry, and does away with manpower problems. You can't say too much for those conveyors and the job they do.

"We can reach virtually any part of the plant with them, from unloading platform to bulk loading facilities, at a great saving in time and cost.

"Actually there's no comparison between the job we can do with this new equipment, and what we performed in the past. Every phase of the operation is faster and vastly improved."

One look around the coop plant and it's easy to see that conveyor belts and more conveyor belts easily play the most important single part in the improvements. The conveyor network—furnished in its entirety by Stedman Foundry and Machine Co. of Aurora, Ind.—covers the inside of the building like a huge blanket fastened to the ceiling, facilitating the movement of materials and cutting labor requirements.

The savings in labor costs alone will pay for the equipment over a period of years. One man with a payloader can empty a box car of raw materials in three hours at the most, and under normal conditions a total of 13 men can operate the entire plant.

"That's about the same labor force we used in previous years," Weddington said, "but it's turning out three times as much fertilizer. Our daily capacity averages 200 tons mixed, or 150 tons shipped, but the maximum labor load will never exceed 17 men, and then only for short periods to meet peak production demands."

Bulk raw materials are unloaded in short order with a payloader dumping them out the side onto a steel drag running underneath the railroad car. Unloading time ranges from an hour and one-half for limestone to three hours for potash.

The drag feeds into an elevator which transports the materials to a reversible conveyor belt, rigged to feed either storage bins or a unit of the batch hoppers.

In most instances, superphosphates move directly to the batch unit. For other raw materials, the belt is simply reversed to dump into the seven storage bins, ranging in capacity from 150 to 175 tons.

A shuttle conveyor, track mounted for mobility, connects with this reversible belt, and is used to fill bins furthest away.

In the past, unloading of this nature required at least two payloaders and considerable time. Material had to be dumped from car to ground, and then transported by loader to the storage area.

A second elevator carries the mixed product to another overhead conveyor arrangement that closely resembles an unbalanced H with a tail. It carries the fertilizer to bins located in another section of the building for curing and aging.

Front view of Co-op plant showing truck-loading platform. Frame building is 100 ft. wide, 270 ft. long.

3,000 Ton Storage Capacity

There are 15 of these bins with a capacity of 200 tons each, giving the plant a total storage capacity of 3,000 tons of bulk fertilizer. All bins—materials, curing and aging—feature bookshelf cribbing walls made from 2x10 lumber secured to steel beams. The open, lattice work effect is designed to stand far greater pressure than the more conventional solid bulkheads.

The main belt of the H-shaped conveyor unit runs almost half the length of the building, and is stationary. It connects with a short cross belt, also station-

ary, which in turn ties into a pair of mobile, track mounted conveyors which can be shuttled back and forth to dump fertilizer into any of the curing and aging bins.

"We are finding this arrangement ideal for our purpose," Weddington said. "It eliminates handling entirely, except for payloaders feeding materials into the batch hoppers and cured fertilizer into the shipping unit, and is certainly faster. We use three Hough payloaders and find them adequate for both jobs.

The entire Coop Service operation is compactly housed in a frame building approximately 270 by 100 feet. Every inch of floor space is utilized to excellent advantage—the conveyor systems run overhead and outside facilities have been geared into the overall picture for maximum effectiveness.

Two spur lines of the Southern Railroad service the plant—one at the south side for the unloading of raw materials and the other at the north for shipping purposes.

Trucks load at a separate outside platform, and shipments run on an approximate 60-40 ratio with the railroad handling the larger share. However, plant personnel pointed out, truck deliveries are steadily increasing.

The building housing the plant has been a Salisbury landmark for many years. Cooperative Fertilizer Service, which also operates a plant at Lumberton, N. C., took it over from the Zenith Corp. in 1947, but did not undertake any extensive remodeling until last year.

Maximum Efficiency Was Goal

Maximum efficiency and automatic operation were the goals when the job was started, and it was virtually a brand new plant which resumed operations last August.

The frame building was extended 80 feet to increase floor space to approximately 27,000 square feet. New equipment was installed throughout with Stedman handling the bulk of the job.

Stedman products include all conveyors and elevators, the unit of eight batch hoppers and other items.

Atlanta Utility Co. of Atlanta, Ga., furnished the mixer. Four Toledo scales are used with the hoppers and a Union Special bag closing machine is operated with the Exact-Weight weighing and bagging unit.

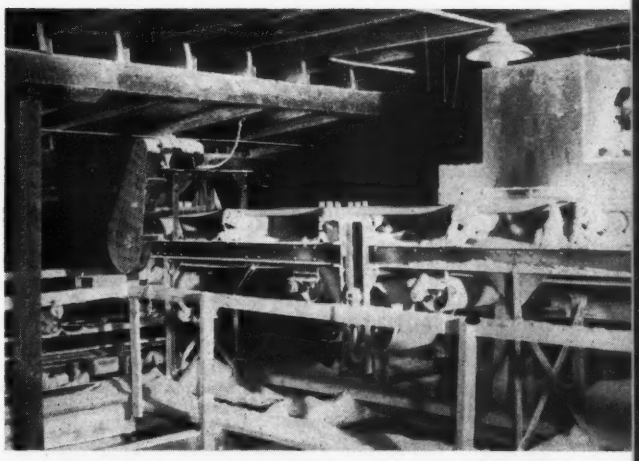
The plant distributes fertilizer in a territory covering most of Piedmont and Western North Carolina. "We service," the superintendent said, "an area running from Stanly county west to the Tennessee boundary, and north and south from the Virginia to the South Carolina state lines.

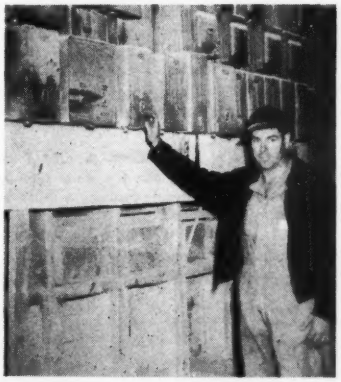
Increased Sales Volume

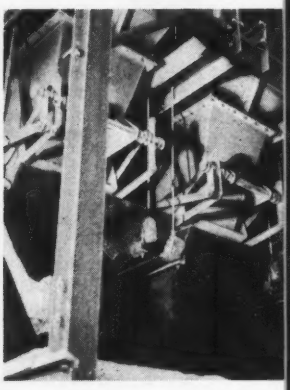
"Naturally," he added, "the new improvements and equipment, with their accompanying stepped up production and speed, have greatly increased our sales volume because we have a lot more fertilizer to sell.

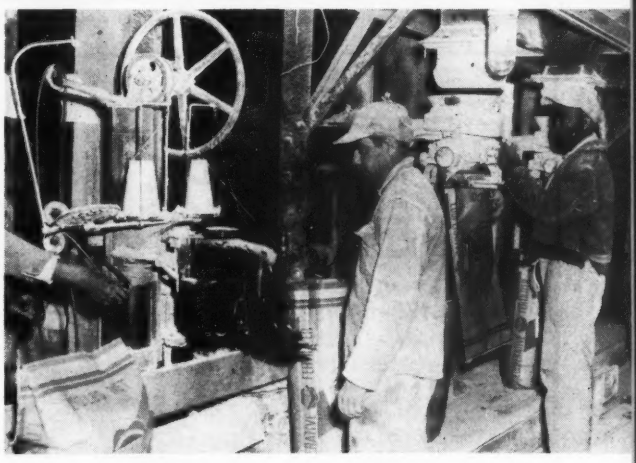
"There are a few other improvements we hope to make in the future. Probably the closest thing to a bottleneck we might encounter at the present could come in connection with the weighing and bagging unit. So far it has been entirely adequate, but to really keep up with production, we could use one of the new, completely automatic weighers now on the market.

"Other than that," Weddington concluded, ' I'd say we have as efficient and compact operation for its size and type as any you'll find. We haven't run a full year with the new equipment, but so far I'm well satisfied. Just as long as those conveyor belts and elevators hold out, I don't think we'll have much trouble." ◆









TOP: Main overhead conveyor belt system used to dump fertilizer into curing and aging bins. LEFT CENTER: B. A. Weddington, superintendent, standing beside the main control panel and its switch boxes at the Salisbury, N. C., plant. RIGHT CENTER: View of the batch hopper unit. BOTTOM: The weighing and bagging unit.

You can rely on **U.S.I.** for

CPR DUST—Combining pyrethrins, piperonyl cyclonene and rotenone for quick kill of a variety of insects with no hazardous residues.

ROTENONE—A "natural" insecticide with low toxicity. Especially useful on truck crops and fruit.

CIPC AND IPC CHEMICALS FOR HERBICIDES—Pre-emergent application controls narrow-leaf plants, particularly annual grasses in cotton and other crops.

ALLETHRIN — the new synthetic insecticide. Combines low toxicity with high efficiency—highly compatible with most insecticides.

PYRETHRUM—unit for unit, still the most versatile and effective insecticide ingredient available.

PIPERONYL BUTOXIDE—The most active of all synergists for pyrethrin, allethrin, and certain other chemicals.

PYRENONE* — blending piperonyl butoxide and pyrethrin for the most effective and economical formulations in a wide variety of combinations.

*Reg. U. S. Pat. Off., U.S.I.

U.S.I. INDUSTRIAL CHEMICALS CO.
Division of National Distillers Products Corporation
120 Broadway, New York 5, N. Y.
Branches in all Principal Cities
In Canada: Natural Products Corporation, Toronto and Montreal

PIONEER
PYROPHYLLITE PRODUCERS

—NOW OFFERS—

"PHYLLITE"
(TRADE NAME)

World's greatest diluent and carrier is non-abrasive, uniform and adheres readily to foliage. It is ground in a Raymond mill—95% through 325 mesh and has a low pH of 5.1. Phyllite is packed in 50 lb. valve bags, 20-ton lots, lowest prices on the west coast, f.o.b. plant.

"STONE MEAL"
(TRADE NAME)

16% organic potash with trace minerals. Immediately available in bulk or sacks. Write us for helpful information and generous sample. New Campo, Calif. plant has increased production to 300 tons per day.

"REDLITE AGGREGATE"
(TRADE NAME)

for aerating soil and amendment, contains 15% iron and 19 other natural trace elements.

MAIN OFFICE
111 NORTH LA CIENEGA BLVD.
BEVERLY HILLS, CALIF.
CRESTVIEW 6-5544 CRESTVIEW 6-4463
or
CHULA VISTA, CALIF.
PO BOX 686 HANCOCK 2-2992

TC
TENNESSEE CORPORATION

TRIPLE
SUPERPHOSPHATE

46 to 48% Available Phosphoric Acid

A MARK OF FLORIDA TRIPLE PHOSPHATE RELIABILITY

20% SUPERPHOSPHATE

Sales Agents: Bradley & Baker
155 East 44th St. New York, N. Y.

U. S. Phosphoric Products
Division
TENNESSEE CORPORATION
Tampa, Florida

Berkshire

. . . . . specialists in magnesia for agriculture

EMJEO (80/82% Magnesium Sulphate)
Calcined Brucite (fertilizer grade) 70% MgO
Calcined Magnesite 85 to 95% MgO

POTNIT
(95% Nitrate of Potash)
for
Special Mixtures and Soluble Fertilizers
Other Fertilizer Materials

INSECTICIDES—FUNGICIDES
Mercury Compounds
for Agricultural Use

DITHIOCARBAMATES
Ferric—Zinc

Export Import

Berkshire Chemicals, Inc.
420 Lexington Avenue, New York 17, N. Y.
Cable Address—"Berkskem" New York
Sales Agents for F. W. Berk & Company, Inc.

The Future of Chemicals In Cotton Weed Control

By W. B. Ennis, Jr.
Agronomist, USDA

Scarcely 10 years ago the users of chemicals for weed control had available very few materials. These included such substances as sodium chlorate, sodium arsenite, sulfuric acid, iron sulfate, non-selective herbicidal oils, etc. The chemicals were employed for the most part to kill vegetation nonselectively. A majority of them are no longer used. Selective weeding of crops with herbicides and other devices as we know it today was virtually unknown 10 years ago.

Indeed, the decade including the war years and those following has been characterized generally by a high tempo of activity in farm chemical development. Someone has said, "Necessity is the mother of invention." It seems to me that the true meaning of this statement is now portrayed in the many new organic chemicals available to farmers for controlling weeds, killing insects, desiccating crops, defoliating crops, controlling plant diseases and so on.

The need for a more effective material to kill mosquitoes which carried malaria to our troops overseas gave rise to DDT. In the footsteps of this material there came in rapid order such insecticides as toxaphene, aldrin, dieldrin and others. The need for substances to regulate the growth of certain plants and war-time interest in biological and chemical agents for use against crops gave rise to 2,4-D. Following its discovery there has followed a succession of new herbicides, some of which are being used on a profitable basis to control weeds.

Presented at the Western Cotton Production conference, Phoenix, Ariz., April 13–14, 1954.

New Impetus to Research

The discovery of 2,4-D and related phenoxy compounds as herbicides in 1944 satisfied in part unfilled wishes of research men and farmers for a chemical to kill weeds growing in crops without causing significant damage to the crops.

Intensive experimentation with 2,4-D and other similar phenoxy compounds over a relatively short period made possible the solution of weed problems in some crops that otherwise cause serious financial losses. The effective use of this group of materials for weed control in small grains, corn, grasslands, ranges and for brush control are well known to all of you.

Annual consumption of 2,4-D and other phenoxy materials for weed control now ranges somewhere between 30 and 40 million pounds. Considering that on the average one pound or less is used per acre, the total acreage receiving treatment with these materials is appreciable.

There is every reason to expect marked expansion in the future. This discovery of 2,4-D and its rapid adoption by farmers and others interested in killing weeds provided the necessary impetus for further development of organic chemicals as herbicides.

Herbicide Techniques

Research on techniques of employing 2,4-D to control weeds led to the discovery that treatment of the soil at particular rates prevented the germination and growth of many annual weeds without causing significant injury to some large-seeded crops. This finding provided the research men with another approach to the problem of controlling annual weeds that germinate and develop concurrently with the crop.

This technique of treating the soil with an herbicide prior to emergence of the crop was a new one and there developed a need for a suitable term to describe the procedure. Thus was born the term pre-emergence spraying or treatment. Virtually all materials showing herbicidal activity are now being tested by research men to determine their effectiveness in controlling weeds when applied as pre-emergence treatments as well as by post-emergence methods.

Other techniques of applying herbicides to do better selective jobs of killing weeds have also evolved. These procedures are based frequently on fundamental differences in the external and internal morphology of the weeds and the crop plant or in their growth habits. For example, directed sprays of some herbicides can be made because the stems of the crop plant tolerate the materials whereas young weeds are killed.

Cotton Weed Control

By employing appropriate techniques of using chemicals to control weeds an interesting chapter in cotton production in the rain belt portion of the cotton region is currently being written. I am referring to the use of chemicals for controlling weeds instead of depending entirely on hand labor to remove them.

The trend toward mechanized production has made it imperative that weeds be controlled. The changeover from hand to machine picking cannot be done efficiently unless grass, vines and other weeds are controlled. Because frequently farmers cannot obtain adequate labor to keep weeds under control, decreased yields of lower quality result.

It is estimated that the average cost of controlling weeds by hand labor has risen to about one-fifth the average gross income per acre. Accordingly, the control of weeds by means other than hand labor is needed to supply the missing link in mechanization of cotton production and also to reduce a major cost item in producing the crop. These various problems and the availability of promising weed control chemicals has provided motivation for intensive studies on the use of chemicals to control weeds in this crop.

In 1947, Leonard, Harris and Arle reported the results of preliminary studies in Mississippi on the use of dinitro compounds as pre-emergence herbicides for cotton. These workers suggested the possibility of using these materials on only a 12-inch band centered on top of the row; this was made with a view to reduce cost per acre of the chemical and at the same time reduce or eliminate hand hoeing.

Between 1947 and 1950 it was found that directed sprays of special herbicidal oils could be used to control small weeds in growing cotton. Thus began the pre- and post-emergence use of weed control chemicals in cotton.

Present Status

From the efforts of investigators representing the USDA, state agricultural experiment stations, industry and other private agencies, guides have been developed for the limited use of herbicidal materials in cotton. These guides emphasize the need for careful seed bed preparation to insure

1. Optimum conditions for germination of the crop,
2. Uniformity and smoothness of seed beds for the application of both pre- and post-emergence herbicides and
3. Satisfactory cultivation of the middles.

Owing to the potent characteristics of the newer herbicides and the precision with which they must be applied, much stress has been placed on the equipment to use, proper calibration of sprayers and the time and frequency of herbicidal treatment. The nature and properties of soils determine whether certain pre-emergence chemicals are to be used and the amount to be applied.

Environmental Factors

Environmental factors, particularly temperature, must also be considered in deciding between herbicides and the rates to use. The complete answers to all these problems have not been found but sufficient progress has been made in work with a few herbicides that farmers can be encouraged to use them on a limited basis. These materials are 3-chloro IPC and the dinitros.

They are used for pre-emergence spraying to control the annual grasses and broadleaves germinating during the first four to six weeks following planting. Special non-

W. B. Ennis, Jr.

fortified oils are recommended to control weeds escaping the pre-emergence treatment and to control those that germinate after the pre-emergence herbicide has dissipated.

Not more than three laterally directed applications of oil, spaced at least five days apart, are recommended because cotton stems are not sufficiently tolerant of the oil after bark cracks begin to form on the lower stem. Farmers having flaming equipment can usually begin flame treatments about the time cotton becomes susceptible to the oil and thereby extend weed control until layby.

Farmers are using chemicals in various ways. Some employ both pre-emergence and post-emergence herbicides and follow with flame cultivation; others make only a pre-emergence treatment followed by hoeing or flaming. Post-emergence applications of oil are the only chemical control methods used in some cases. Most state experiment stations recommend the use of herbicides as pre- and post-emergence treatments. Some experiments in Mississippi have shown that by using appropriate chemicals as a supplementary tool to control weeds in combination with various improved practices the number of hoe hours per acre may be reduced from 38 to four.

In 1953 farmers who used chemicals on cotton were satisfied in general with the results and expect to continue and expand the practice. Many of their neighbors are planning to initiate similar programs this season.

New Chemicals

The newer herbicides presently showing most promise may be divided into five major groups and these are receiving much attention by research men. The groups are

1. The phenoxy compounds, of which certain derivatives, such as 2,4,5-trichlorophenoxyethyl sulfate (Natrin) show some promise for use in cotton,
2. The dinitros,
3. The carbamates which include IPC and chloro-IPC,
4. The ureas, represented by CMU and its analogs and
5. A miscellaneous group that includes aromatic hydrocarbons (oils) and other organics.

One or more members of the dinitros, the carbamates, the ureas and the aromatic hydrocarbons are currently being used or are being studied as herbicides for cotton. The weed control laboratory of the USDA at Beltsville, Md., under the leadership of Dr. W. C. Shaw, has made an extensive survey of the carbamate family to determine the effects of the materials on different crop plants and weeds. More than 400 compounds

have been screened for their weed control effectiveness in 30 different crops. Promising carbamates and other substances are also being evaluated at several locations in the cotton belt by both Federal and state workers. Some of the new materials show what is termed specificity of action; that is, they kill or inhibit some plant species but leave unharmed other species. Cotton has shown high tolerance to a few of the carbamates and to other types of chemicals at dosages that give exceptionally good weed control.

There is every reason to expect the availability of new and better herbicides to attack specific weed problems in specific crops under certain climatic or environmental conditions.

New Urea Compounds

Three new urea compounds show excellent promise as pre-emergence herbicides for cotton. These are CMU, (Karmex W), 3-(3-4-dichlorophenyl)-1, 1-dimethyl urea (Karmex DL) and 3-phenyl 1, 1-dimethyl urea. The urea materials present some unsolved problems as regards residual effects in the soil and other aspects of their usage have not been investigated sufficiently to warrant general recommendations.

Herbicidal materials with varying properties are being tested for their usefulness in controlling specific troublesome weeds such as Johnson grass, nutgrass and vines. The effectiveness of the materials has been demonstrated adequately to justify attempts to devise methods for their safe employment to control certain of the susceptible perennial weeds occurring in cotton fields.

A new compound closely related to TCA bearing the trade name Dalapon has shown promise for control of Johnson grass and other grasses.

Another material known as Amino triazole inhibits chlorophyll development in certain species and this substance will receive considerable attention this year to determine its place in the weed control field.

More Research Needed

Expanded research is needed to keep pace with the problems constantly arising in the weed control field. Fundamental knowledge is needed on how and why certain chemicals behave as herbicides in order that sound guiding principles may be developed relative to their employment for selective weed control.

The influence of soil and environmental factors upon the action and behavior of the materials and the responsiveness of weeds and crops to different kinds of treatments must be known before large-scale use can be considered workable and safe.

The weed research men are attempting to meet the challenge presented by those diverse problems in every segment of the work. Careful thought has been given on how the problems can be attacked to make the most efficient use of the personnel, funds, equipment and facilities available. A joint and coordinated effort by all workers in the weed control field has been considered a logical approach. Accordingly, in cooperation with workers in the state experiment stations, the Section of Weed Investigations of the USDA has recently expanded the Federal-state work on weed control.

You people are already familiar with the USDA and other personnel working on weed control programs in the West. Fred Arle, located in Arizona, is doing important work in devising techniques of employing chemicals to solve some of the cotton weed problems under irrigated conditions. T. J. Sheets, shortly to be placed at Davis, Cal., to work in cooperation with Dr. O. A. Leonard, Chester Foy, John Miller and H. F. Miller, employees of the USDA at Shafter, Cal., should strengthen materially the overall weed control studies in irrigated cotton. I feel confident these men and other investigators such as J. W. Whitworth of New Mexico will evaluate every conceivable procedure for using herbicides safely and efficiently in cotton of this region.

Some of the pre-emergence herbicides proving satisfactory in rain-grown cotton may be unsatisfactory when applied by conventional methods under irrigated conditions because a timely rain fails to leach the herbicide downward to the germinating weed seeds.

Accordingly, other techniques of applying the substances to do a proper job may have to be worked out or new materials must be made which have the necessary properties for controlling weeds under your conditions.

At College Station, Tex., Dr. Richard Behrens is giving major emphasis to physiological problems arising from the use of chemicals to control brush which encompasses the impact of using herbicides safely in cotton-growing areas of the Southwest.

At State College and Stoneville, Miss., many phases of the weed control problems in cotton are being studied by V. C. Harris, C. G. McWorter and myself in cooperation with the Mississippi Experiment Station workers and other part- or full-time Federal workers.

Performance Studied

The performance of cotton herbicides under varying environmental conditions and on different soils is being studied. The downward movement pattern and persistence of the materials in different soil types are being evaluated. The comparative efficiency of new herbicides is being explored and methods of practical application are being evolved. Other important features of the work deal with

1. Developing equipment for safe and precision application (This is being done by O. B. Wooten, Jr., a cooperative employee of the USDA and the Mississippi Experiment Station, and other agricultural engineers),
2. Economic studies on various combinations of chemicals with current tillage and production methods and
3. The relation of plant structures to the toxicity of chemicals.

In cooperation with weed workers of the Georgia Experiment Station Dr. Ellis Hauser of the USDA is working on practical and basic weed control problems peculiar to that section of the cotton belt and is placing considerable emphasis on the control of nutgrass and Johnson grass.

Dr. Donald Moreland has been placed at North Carolina State College to conduct fundamental studies on the mode of action and other physiological aspects of the

herbicides used in cotton. In addition to the investigators and work described above, major research work on cotton herbicides is being done in all cotton growing states by experiment station workers. Also, strong support and effort are being given by the chemical industry to herbicide investigations.

Future Outlook

Scientists in industry and in public agencies are continuing their search for chemical substances to do a particular job for the farmer. Indeed, in the weed control field there is a bee-hive of activity in attempts to develop new and better chemicals to control weeds in our crops. Many of these show much promise for weed control in both agronomic and horticultural crops. The outlook for newer and better chemicals to control weeds selectively in cotton by both pre- and post-emergence applications is good.

I have unbounded confidence that the weed research men will keep alert eyes on the new chemicals synthesized by different laboratories and will find methods of utilizing them to solve our many weed problems. The characteristics displayed by some of the new herbicides under study indicate that particular herbicides may be manufactured to control definite weeds under certain circumstances in a specific crop. Within a relatively short time the application of herbicides is expected to become an integral part of the production practices on most cotton farms.

By the use of chemicals to control weeds and thereby complete the mechanization of cotton, a brighter and more satisfying future for the cotton growers will follow. ◆

Pest Reports

Gypsy Moth Found In Lansing, Michigan

The gypsy moth, which for many years has been rather successfully contained in the northeastern section of the United States, was discovered May 20, 1954, in Lansing, Mich. The known infested area is in the southern edge of Lansing and consists of approximately 10,000 acres.

Immediately upon discovering the infestation, action was taken by the Michigan State Department of Agriculture and the USDA to eradicate the infestation. Application of DDT by mist blower in the known infested area has been made as well as extensive air applications in the immediate and surrounding areas. The Michigan legislature has appropriated funds for control and extensive survey.

Survey Shows Khapra Beetle in New Mexico

The khapra beetle (*Trogoderma granarium*), a serious pest of certain stored products, particularly grains, was first discovered on the North American continent in Tulare county, Cal., in November, 1953. Subsequent surveys by the California State Department of Agriculture indicated that a heavy infestation of this insect occurred in Fresno as early as 1946, and that it was an established storage pest at the time of discovery. In early February, 1954, an infestation was reported from Phoenix, Ariz.

Following these developments the Standard Quarantine committee of the Western Plant Board petitioned the USDA for assistance in conducting a survey to determine the general distribution of *T. granarium* in the western states. A survey was undertaken in early April with the Economic Insect Survey section, Plant Pest Control Branch, The Agricultural Marketing Service and certain western states cooperating.

The number of inspections of grain warehouses and mills were as follows: Colorado 67, Utah 77, Idaho 29, New Mexico 21, Texas 6, Nevada 19 and Oregon 36. Limited inspections were made also in Washington state. Inspections in Arizona and California were limited since the pest had already been found in those states and considerable work had been conducted by state personnel. For the purpose of this detection survey inspections in Wyoming and Montana were not believed necessary.

According to records of the states involved and results of this survey, infestations of *T. granarium* in the United States are known to be in the following counties: Arizona—Maricopa, Pinal, Pima, Yuma and Mohave; California—Imperial, Kern, Riverside, Tulare and Fresno; New Mexico—Roosevelt and Curry.

In addition to being a serious pest of stored products this dermestid is of concern to the brewing industry because, in England, it is known to infest the malt houses. Dry storage conditions are not a hindrance to the activities of the pest since it can complete its life cycle in grain with moisture content as low as two per cent. Control is difficult and fumigation recommendations are double the dosage ordinarily used.

Based on material received from Economic Insect Survey Station, Plant Pest Control Branch, Agricultural Research Service, USDA, supplemented with information received by FARM CHEMICALS *from Federal and state agencies.*

Mite & Aphid Increase

Spider mites were building up on apple in Minnesota and at Vincennes, Ind., around the middle of the month. Virginia and Ohio reported serious infestations in some orchards. Rosy apple and apple aphids were showing rapid increase in Delaware and were extremely heavy on water sprouts in southern Pennsylvania. New Jersey reported increases of apple aphid in untreated apple orchards. Rosy aphid infestations have been particularly severe in the Kearneysville, W. Va., and Vincennes, Ind., areas, as well as in Rockland county, New York.

Cereal & Forage Insects

The armyworm outbreak which began in May continued in several states during June. In Kansas a serious outbreak occurred in the eastern part of the state with loss of grain heads reaching 60 per cent in some fields. Many thousands of acres of wheat, barley and pastures received aerial applications of insecticides.

Serious infestations were reported from Missouri with the heaviest populations being in the Missouri valley from Kansas City north and the Mississippi valley from St. Louis to the Iowa line. In Indiana the infestation extended almost to the northern line with head damage reaching 50 per cent in some rye fields of the southwestern part of the state. Although heavy infestations developed in Tennessee a wide spread control campaign helped to reduce losses in many areas.

Spittlebugs Active

Spittlebugs were beginning to be reported from several states by the middle of June. In eastern Illinois an average of 10 adults per sweep were taken in clover and alfalfa fields. Adults first emerged from alfalfa in the central Ohio area on May 25, and were unusually abundant in Wisconsin meadows, strawberry plantings and hay fields. Adults were also numerous in various Maryland and Virginia counties.

Cutworm Damage

Cutworms were also very important insects during June. In Montana damage was reported from Musselshell and Chouteau counties. In sandy soil of Logan county, Neb. area, 30 per cent or more damage resulted to corn. Populations up to 200 larvae per square foot were reported from some Kansas fields. In the northern third of Missouri cutworms caused heavy damage to legumes but parasitism was rapidly developing. Although some replanting of corn has been necessary, damage was declining in Illinois by the middle of June but is still a possibility in the northern part of the state. Other states reporting serious damage included Georgia, Mississippi, Tennessee, North Carolina and Indiana.

Boll Weevil Picture

Although the boll weevil picture showed rather spotted populations in some sections, it approximated rather closely that of last year for the same period. Examination of 194 fields in 15 Delta counties of Mississippi showed 99 infested with an average of 161 weevils per acre compared to an average of 152 in infested fields last year.

In the northern areas of Louisiana overwintered weevils were heavier than normal in many fields. However, in the southwestern part of the state populations were very light. In Texas infestations continued to increase in the lower Rio Grande valley. Populations were light in the coastal areas but overwintered adults were numerous in untreated fields of central, east, east central and northeast Texas.

In North Carolina populations are expected to be below last year while weevils found in trap plots of cotton at Florence, S. C., were 69 as compared to 76 in 1953, 60 in 1952, one in 1951 and 3,072 in 1950. Several south central Alabama counties showed unusually high populations but southeastern counties were lighter with emergence evidently slow.

Overwintering Weevils

Large numbers of overwintering weevils were found in Arkansas fields located near good hibernating quarters and weevils have been found in cotton in Caddo, Muskogee and Choctaw counties, Okla.

Injurious numbers of bollworms were found in scattered fields of the Lower Rio Grande valley and southwest Texas during early June. Although present in the Yuma, Ariz., area predators were keeping infestations at a low level. Heavy populations were recorded in some Arkansas cotton fields and for this time of year an unusually high number of eggs were present. By the middle of June larvae had been reported from Pitt and Scotland counties, N. C.

Cotton Thrip

During June, thrips were of concern to cotton growers in several states. By the early part of the month, in the Rio Grande valley of New Mexico as far north as Socorro, populations had increased tremendously. In Graham and Cochise counties, Ariz., thrips were the principal cotton pests as was the case in Oklahoma and South Carolina.

Injurious infestations in Texas were found from the central area northward. Aphids were the number-one cotton insect in New Mexico. Spider mites were already causing damage in some Arkansas counties and cutworms damaged plantings in California and Georgia.

CALENDAR

July 12-14—Summer meeting, Northeast branch, Amer. Soc. of Agronomy, New Brunswick, N. J.
July 20-22—Pacific N.W. Plant Food Assn. fert. conf., Klamath Falls, Ore.
July 22-23—Southwest Fert. conf., Buccaneer Hotel, Galveston, Tex.
July 28-30—Beltwide Cotton Mechanization conf., Little Rock, Ark.
Aug. 10-12—Ohio Pesticide Institute summer tour from Wooster to Northwest O.
Aug. 11—Annual Kentucky Fert. conf., Guignol Theater, U. of Ky., Lexington.
Aug. 17-21—25th Rocky Mt. Conf. of Entomologists, Cameron Pass 4-H Club Camp, 45 mi. west of Ft. Collins, Colo.
Aug. 25-27—American Phytopathological Society with the Pacific div., APS, and the Potato Assn. of America, joint annual meetings at the YMCA Conference Camp, Estes Park, Colo.
Sept. 8-10—NAC meeting, Spring Lake, N. J.
Oct. 6-7—Fifth annual conv., Pacif. N.W. Plant Food Assn., Sun Valley, Ida.
Oct. 18-19—Fertilizer section, National Safety Congress, Chicago, Ill.
Oct. 25-29—American Soc. of Agronomy meeting, Minneapolis, Minn.

Fungicide Tests Now Available

"Results of 1953 Fungicide Tests" may be purchased in bound and covered form for $1 per copy by sending orders with remittance to Dr. W. D. Mills, Department of Plant Pathology, Department of Agriculture, Cornell University, Ithaca, N. Y. The publication of these results is under the sponsorship of the American Phytopathology Society. Underwriting of this project was accomplished through contributions from many commercial companies identified with the pesticide industry. Dr. D. A. Roberts, Department of Plant Pathology, Cornell University, will be in charge of this project during the current year.

Statistics

Calif. Fert. Report

In the first quarter of 1954 a total of 214,105 tons of fertilizers was sold in California, including 48,352 tons of dry mixed goods and over 50,000 tons of ammonium sulfate.

According to a recent California Department of Agriculture announcement, liquid mixed fertilizers accounted for 3,715 tons; ammonium nitrate, 20,296; normal superphosphate, 16,910; ammonium phosphate-sulfate, 14,139; ammonia solution, 13,029 and calcium nitrate, 12,024 tons. The top dry mixed fertilizers were 8-8-4, 10-10-5 and 17-7-0.

The report also showed sales of agricultural minerals at 149,529 tons, of which 131,017 tons was gypsum.

March Super Figures

Superphosphate production in March totaled 227,383 short tons (100 per cent APA), according to the Bureau of the Census, an increase of 21 per cent over the previous month and 14 per cent above the figure for March, 1953.

Shipments of all grades totaled 160,618 tons, up 26 per cent and 10 per cent respectively over February, 1954, and March, 1953. Stocks on hand at the end of the month were 17 per cent less than on March 1 but 15 per cent higher than at the end of March, 1953.

For the period July, 1953, through March, 1954, preliminary totals show production and shipments of total superphosphate down one and two per cent, respectively, from the previous period; normal and enriched down five and eight and wet base down 18 and 23 per cent. Only concentrated super showed gains, 17 and 12 per cent, respectively.

Surfactant Production

A preliminary Tariff Commission report shows that domestic output of surface active agents last year was 922 million pounds, an increase of 24 per cent over 1952. Sales amounted to 732 million pounds valued at $145 million.

Production of cyclic surfactants totaled 594 million pounds, up 116 million, and sales reached 438 million pounds, valued at $73 million. Acyclic surface active agents accounted for 327 million pounds, up 24 per cent, and sales totaled 293 million pounds, valued at $72 million.

Sulfated and sulfonated cyclic and acyclic compounds and acyclic salts of fatty acids amounted to 751 million pounds or about 81 per cent of the total. Output of cyclic and acyclic nonsulfonated nitrogen-containing compounds was 58 million pounds and that of all cyclic and acyclic esters and ethers was over 110 million.

Railroad Fert. Tonnage

According to data compiled by the Association of American Railroads in 1953, Class I railroads originated over 47 million tons of chemicals and chemical products—a total including nearly 12 million tons of fertilizers, 4.5 million tons of sulfur and 3.4 million tons of sulfuric acid.

Miss. Herbicide Usage

In 1953, herbicides were applied to about 100,000 acres of Mississippi cotton at a savings to farmers estimated at around $800,000.

Experts point out that if used on the state's entire cotton acreage, chemical weed killers could reduce cotton production costs 20 million dollars a year.

Production - March, 1954

Compiled from government sources

Chemical	Unit	March 1954	March 1953	February 1954
Ammonia, synth. anhydrous	s. tons	237,535	189,644	206,358
Ammonia liquor, coal & coke—(NH_3 content)	pounds	3,538,074	4,361,052	3,035,913
Ammonium nitrate, fert. grade (100% NH_4NO_3)	s. tons	131,892	113,485	120,265
Ammonium sulfate				
synthetic (technical)	s. tons	79,203	46,107	63,193
coke oven by-product	pounds	142,926,392	163,448,276	133,869,544
BHC (Hexachlorocyclohexane)	pounds	6,372,722	——	5,367,965
Gamma content	pounds	901,371	——	705,317
Calcium arsenate (commercial)	pounds	——	2,935	——
Copper Sulfate (gross)	s. tons	6,656	——	5,152
DDT	pounds	8,035,605	——	**6,965,696
2,4-D Acid	pounds	2,739,774	——	**2,138,035
esters & salts	pounds	2,514,670	——	**1,483,262
esters & salts (acid equiv.)	pounds	1,935,911	——	**1,188,995
Lead Arsenate (acid & basic)	s. tons	1,084	1,144	1,063
Phosphoric acid (50% H_3PO_4)	s. tons	264,185	214,811	*234,740
Sulfur, Native (Frasch)	l. tons	472,445	471,615	437,244
Recovered	l. tons	30,000	28,581	27,000
Sulfuric Acid, gross (100% H_2SO_4)	s. tons	[1]1,222,232	1,270,151	1,092,447
Chamber process (100% H_2SO_4)	s. tons	230,461	266,923	216,578
Contact process (100% H_2SO_4)	s. tons	[1]991,771	1,003,228	875,869
Superphosphate (100% APA)	s. tons	227,383	200,067	*187,464
Normal & Enriched (100% APA)	s. tons	181,371	159,646	*143,847
Concentrated (100% APA)	s. tons	45,050	39,274	*43,010
Wet base (100% APA)	s. tons	962	1,147	*607
2,4,5-T Acid	pounds	——	——	**205,570

* Revised. ** Partly estimated.

[1] Includes quantities for two plants not previously reporting.

FERTILIZER MATERIALS MARKET

New York

June 12, 1954

Sulfate of Ammonia: With prices announced for the new fertilizer season about $2 per ton under the old schedule at most production points, producers were in the process of booking business for shipment June forward. It was stated that synthetic producers were meeting the coke oven prices at most points.

Nitrate of Soda. No price changes were noted and stocks were ample at most Atlantic and Gulf ports to take care of expected demand.

Ammonium Nitrate. Demand continues good in most areas for prompt shipment.

Urea. Demand was slow and stocks were adequate to take care of expected demand. Market was quoted at $120, f.o.b. ports, for imported material; and domestic material was available at a higher delivered price.

Nitrogenous Tankage. This material is being offered for summer shipment at various prices based on shipping point. Market nominally quoted at from $3 to $4 per unit of ammonia ($3.64 to $4.86 per unit N), f.o.b. production points.

Castor Pomace. A heavy demand was noted for this material in the last few weeks with producers unable to supply the demand. Last sales were on basis of $27 per ton, f.o.b. production points.

Organics. Trading in organic fertilizer materials was on a steady basis but most buyers were only buying for their nearby needs and were not anxious to buy future positions. Soybean meal, after working lower in price, recovered somewhat and present quotations were on the basis of $84 per ton in bulk, f.o.b. Decatur, Ill. Linseed meal was easier in price because of the slow demand. With some cottonseed crushing mills shutting down for the season, cottonseed meal firmed up slightly and was available for prompt shipment in bags at $65 per ton, f.o.b. Memphis, Tenn. Tankage last sold at $7.50 per unit of ammonia ($9.12 per unit N), f.o.b. Eastern points, with blood offered at $8 ($9.72 per unit N), f.o.b. New York.

Fish Meal. Reports from fishing centers indicated a poor catch so far this season because of the cool, wet weather and fish meal was in demand from the feed trade at $140 per ton, f.o.b. fish factory. Some imported material was also available.

Bone Meal. Demand for this material eased because of the end of the fertilizer season and also buying by the feed trade was limited. Market nominally quoted at $60 per ton, f.o.b. shipping points.

Hoof Meal. This material was easier in price because the fertilizer season is over and was nominally quoted at $7 per unit of ammonia ($8.51 per unit N), f.o.b. Chicago.

Superphosphate. Stocks of regular 20 per cent material were plentiful at most points and triple superphosphate for the first time in a number of years was available for prompt shipment because several new plants were in production.

Potash. Because of the change in pricing methods for the new contracts, some buyers were a bit puzzled and one producer was reported to have revised his schedule of prices. In most cases the discount system was eliminated entirely and other producers made special prices at Atlantic ports to meet foreign competition.

Philadelphia

June 12, 1954

The raw materials market is very quiet and considerably weaker than a month ago. Blood, tankage and bone meal are softer. Castor pomace is practically off the market, and ammonium nitrate and triple superphosphate are in short supply. New sulfate of ammonia and potash prices are in effect.

Ammonium Nitrate. While production has increased over the same period last year, supply is still short of the demand.

Sulfate of Ammonia. Prices are now lower at $42 to $47.50 per bulk ton for coke-oven, depending upon shipping point, and $42 to $45 for synthetic grade.

Nitrate of Soda. Seasonal movement is of normal and satisfactory dimensions. The supply is ample with no price changes reported.

Blood, Tankage, Bone. Market in packing-house by-products is considerably easier. Blood is priced at $8 per unit of ammonia ($9.72 per unit N), in the East, and $8.25 ($10.02 per unit N) in the Chicago area. Tankage is at $7.75 per unit ($9.42 per unit N), in New York area, and $8.50 ($10.33 per unit N) Chicago, with bone meal nominal at $60 to $62 per ton. Hoof meal is quoted at $7.25 per unit of ammonia ($8.82 per unit N), Chicago, with scant inquiry.

Castor Pomace. While the last sale reported was at $27 per ton, it was quite some time ago and there is nothing now offered.

Fish Scrap. Although a price of $140 per ton has been named for menhaden fish meal, the supply is limited and current fishing operations are reported not at all satisfactory.

Phosphate Rock. While the supply and demand positions appear to be about even, an advance in price is anticipated when new labor contracts are signed.

Superphosphate. The triple grade continues to be in tight supply. Stocks of normal grade are ample but demand is quiet.

Potash. New muriate prices effective until July 1 are indicated as 36 cents to 37½ cents per unit K_2O at Carlsbad, N. M., and 44½ cents Trona, Cal. Sulfate is $32 per ton, and potassium magnesium sulfate $13.75 per ton at Carlsbad, N. M.

MONARCH SPRAYS

This is our Fig. 645 Nozzle. Used for Scrubbing Acid Phosphate Gases. Made for "full" or "hollow" cone in brass and "Everdur." We also make "Non-Clog" Nozzles in Brass and Steel, and

Stoneware Chamber Sprays

now used by nearly all chamber spray sulphuric acid plants.

CATALOG 6-C

MONARCH MFG. WORKS, INC.
2501 East Ontario Street, Philadelphia, Pa.

FEEDING AND FERTILIZER MATERIALS

(SINCE 1898)

SAMUEL D. KEIM
1343 ARCH STREET
PHILADELPHIA 7, PA.

Dictionary of Fertilizer Materials & Terms

A reference booklet for all who are interested in the manufacture and use of chemical fertilizers. It's "priceless" to agricultural chemists and fertilizer salesmen.

Price **$1.00** postpaid

farm chemicals 317 N. Broad Street Philadelphia 7, Pa.

WANTED
33% AMMONIUM NITRATE
PREMIUM PRICES
Box No. 460
Farm Chemicals, Philadelphia 7.

SHUEY & COMPANY, Inc.

Specialty: Analysis of Fertilizer Materials and Phosphate Rock. Official Chemists for Florida Hard Rock Phosphate Export Association. Official Weigher and Sampler for the National Cottonseed Products Association at Savannah; also Official Chemists for National Cottonseed Products Association.

115 E. BAYSTREET, SAVANNAH, GA.

WILEY & COMPANY, Inc.

Analytical and Consulting Chemists

BALTIMORE 2, MD.

UREA

CASTOR POMACE
BONEMEAL

• Stocks Available at Most Ports •

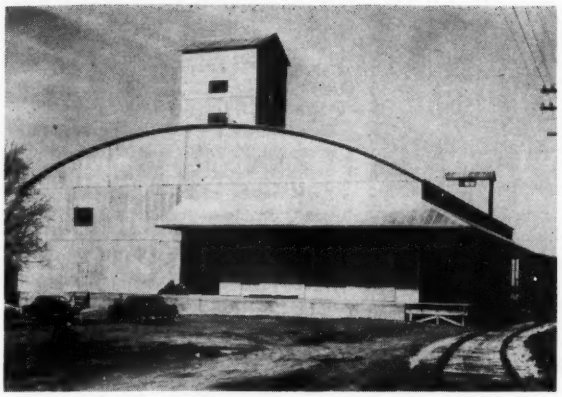
NITROGENOUS TANKAGE
SHEEP MANURE

ALL FERTILIZER MATERIALS

Send Us Your Inquiries

FRANK R. JACKLE

405 Lexington Ave. New York 17, N. Y.



Tri-State's new Henderson, Ky., fertilizer plant.

Tri-State Opens Henderson Plant

WHEN Tri-State Chemical Co. dedicated its new fertilizer plant at Henderson, Ky., more than 500 of the plant's customers, dealers, friends and members of the press and radio turned out for the unveiling.

They heard addresses by Ben Adams, Kentucky commissioner of agriculture; Hecht Lackkey, mayor of Henderson; John W. Manning, Tri-State president and A. T. Kennedy, president of Davidson-Kennedy Co.

Standing: John W. Manning; D. S. King, Cumberland Chem. Co.; Elmer D. Young; Ben Adams. Kneeling: Hoke Smith.

Davidson-Kennedy furnished complete engineering service, manufacturing equipment and construction supervision for the Henderson facilities.

Incorporated in the plant is "the most modern fertilizer machinery." Payloaders transport materials to an elevator which hauls them to individual storage bins in a cluster hopper. After formulation in a weigh hopper, batches are dropped to the batch mixer, then shipped to storage or to bagging.

"This plant represents the last word in engineering achievement," states E. C. Kontz, Davidson-Kennedy vice president.

Potential plant output is approximately 20,000 tons per year of high grade, high analysis fertilizer. Provisions have been made in the design of the plant for increasing capacity to meet requirements.

Officers of Tri-State, which was incorporated in 1953, are J. W. Manning, president; Elmer D. Young, vice president and Hoke Smith, superintendent. ◆

Alphabetical List of Advertisers

American Agricultural Chemical Co., New York City 17
American Potash & Chemical Corp., New York City 46
Armour Fertilizer Works, Atlanta, Ga. 10
Ashcraft-Wilkinson Co., Atlanta, Ga. ..... Front Cover, 28
Atlanta Utility Works, The, East Point, Ga. ..... —
Baker & Bro., H. J., New York City ..... —
Berkshire Chemicals Inc., New York City 54
Birmingham Tank Co., Birmingham, Ala. 15
Bradley & Baker, New York City ..... —
Bradley Pulverizer Co., Allentown, Pa. ..... —
Butler Manufacturing Co., Kansas City, Mo. 26
Calcium Carbonate Co., Chicago, Ill. 15
Chemical Construction Corp., New York City 9
Clark Equipt. Co., Battle Creek, Mich. ..... —
Commercial Solvents Corporation, New York City ..... —
Davison Chemical Co., division of W. R. Grace & Co., Baltimore, Md. ..... Back Cover
Diamond Alkali Co., Newark, N. J. ..... —
Duval Sulphur & Potash Co., Houston, Tex. 28
Dave Fischbein Co., Minneapolis, Minn. ..... —
General Industrial Development Corp., New York City ..... —
Grand River Chem. Div., Deere & Co., Tulsa, Okla. 50
Gruendler Crusher & Pulverizer Co., St. Louis, Mo. ..... —
Hammond Bag & Paper Co., Wellsburg, W. Va. 1
Hudson Pulp & Paper Corp., New York City ..... —
International Paper Co., Bagpak Div., New York City 42
International Minerals & Chemical Corp., Chicago, Ill. ..... —
Jackle, Frank R., New York City 62
Keim, Samuel D., Philadelphia, Pa. 62
Kraft Bag Corporation, New York City 39
Lessmann Mfg. Co., Des Moines, Ia. ..... —
Link-Belt Co., Chicago, Ill. ..... —
Lion Oil Company, El Dorado, Ark. 20
Marietta Concrete Corp., Marietta, Ohio ..... —
Michigan Chemical Corp., St. Louis, Mich. 40
Monarch Mfg. Works, Inc., Philadelphia, Pa. 62
Monsanto Chemical Co., St. Louis, Mo. ..... —
National Lime & Stone Co., Findlay, Ohio ..... —
Nitrogen Division, Allied Chemical & Dye Corp., New York City 34
Pennsylvania Salt Mfg. Co., Philadelphia, Pa. ..... —
Phillips Chemical Co., Bartlesville, Okla. 8
Pioneer Pyrophyllite Producers, Beverly Hills, Calif. 54
Pittsburgh Coke & Chemical Co., Agricultural Chemical Div. ..... Second Cover
Potash Co. of America, Washington, D. C. ..... —
Poulsen Co., Los Angeles, Calif. 36
Power—Curve Conveyor Co., Denver, Colo. ..... —
Republic Chemical Corp., New York City 9
Schmutz Mfg. Co., Louisville, Ky. 44
Shell Chemical Corporation, Denver, Colo. 2
Shuey & Company, Inc., Savannah, Ga. 62
Southwest Potash Corporation, New York City 24
Spraying Systems Co., Bellwood, Ill. ..... —
Stedman Foundry and Machine Co., Inc., Aurora, Ind. 6
Summit Mining Corp., Carlisle, Pa. ..... —
Tennessee Corporation, Atlanta, Ga. ..... Third Cover, 13
Texas Gulf Sulphur Co., New York City 19
The Thomas Alabama Kaolin Co., Baltimore, Md. ..... —
Union Bag & Paper Corp., New York City ..... —
U. S. Industrial Chemicals Co., New York City 54
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla. 54
United States Potash Co., New York City 12
Wiley & Company, Inc., Baltimore, Md. 62
Wiley & Sons, John, New York City ..... —
Woodward & Dickerson, Inc., Philadelphia, Pa ..... —

editorial

New Ideas Through Atomic Energy

THE fertilizer industry is in the somewhat peculiar position of being a major supplier of uranium and also a major recipient of many of the peacetime benefits of the atom, as pointed out by Representative W. Sterling Cole, head of the Congressional Joint Committee on Atomic Energy, at one of the recent conventions.

During the NFA meeting we spoke with James A. Barr, Jr., assistant director, domestic production, Atomic Energy Commission, who has done an excellent job of keeping the press informed on the phosphate-uranium program.

Barr cited some of the fascinating crop and soil research made possible through the applications of atomic energy and suggested that we read the testimonies given by leading agricultural scientists at hearings before the Subcommittee on Research and Development of Representive Cole's committee.

USDA's Dr. Byron T. Shaw was one of those who testified, providing an excellent review of past and present work being carried out by our scientists. Here are a few brief excerpts from his remarks, which help to show the extent of current activities:

"Radioisotopes are proving of great value as markers in following hibernation and migration of insects, and as tracers for insecticides, particularly the ones that are systematically taken in by plants.

"Scientists . . . are using radioisotopes in attempts to develop better solvents for insecticides applied to plants, which will coat the leaves evenly and yet not interfere with the absorption of the insecticides by the insect.

"Chlorosis of plants due to the immobility of trace elements . . . is being investigated . . . The movement of mineral nutrients in plants is also being studied . . .

"Radioactive tracers are showing how conventional fertilizers can be used more efficiently and economically . . . We can . . . compare two materials as to their efficiency in supplying the plant, without reference to growth response or confounding with climate. Or we can compare two placements. . .

"We can measure capacity of the soil to supply a plant nutrient by adding a radioactive fertilizer as a partial source of the nutrient to a growing plant."

IN TESTIMONY by Dr. H. B. Tukey, Michigan State College, mention was made of both dormant and foliar feeding. Dr. Tukey related how, in wintertime, Michigan State workers placed radio phosphorus and radio potash in solutions, then dipped cotton gauze and wrapped it around tree branches. Within 24 to 48 hours, even in midwinter and at below freezing temperatures, the radio materials were found in vertical branches at distances 18 inches to two feet above the point of application. Accumulation was noted near the buds.

He also mentioned that they found the surface area of twigs, branches and trunk of a 25 year old apple tree to measure 800 square feet and were able to spray on this the equivalent of three pounds of fertilizer.

Tukey considered especially exciting the progress made in foliar feeding. The leaf is no longer considered to be covered by an impervious cuticle—according to Tukey it has been found a very efficient organ of absorption with materials moving into the upper surface as well as the lower.

To show that foliar feeding could be effective, he cited work at Washington State in which the leaf surface of a 12 year old apple tree was found equivalent to one-tenth of an acre, a large feeding area. Tukey added that, if nutrients are applied to leaves in soluble form as much as 95 per cent of that applied may be used by the plant, while only 10 per cent is used from a similar amount applied to the soil.

Of equal interest is that horticulturists have found critical periods in the development of a plant when nutrients should be applied.

A number of other noted workers appeared before the Subcommittee and their remarks are worth reading They discussed work involving plant breeding, plant pathology, animal metabolism and feeding, food sterilization and other phases of activities.

Many of those at the NFA convention were able to pick up a copy of the hearings from a supply which was provided by Barr. If you haven't read this small but interesting publication* we suggest you try to get a copy. The work cited by these various authorities is opening broad new avenues to our industry.

—GEO. P. TEEL, JR.
Managing Editor

---

* *"The Contributions of Atomic Energy to Agriculture." Hearings before the Subcommittee on Research and Development of the Joint Committee on Atomic Energy. Held March 31 and April 1, 1954. U. S. Government Printing Office, Washington, D. C. Available from the committee and the public printer.*

195—Penco BHC

Pennsalt's new Calvert City, Ky., BHC plant is now in full production, turning out both high gamma and standard materials. The 46 per cent material permits manufacture of more highly concentrated dust bases, wettable powders or liquid formulations while 14 per cent standard BHC, available in flake form, is for those who wish merely to grind and extend it into dust base or finished materials. A technical bulletin is available.

CIRCLE 195 ON SERVICE CARD

196—NH_3 Equipment

A catalog has been issued by the Anco Manufacturing & Supply Co., describing its complete stocks of NH_3 equipment. Included is information on bulk plant equipment, storage tanks in all sizes, pumps and compressors, valves, hose, couplings, field and applicator tanks and accessories.

CIRCLE 196 ON SERVICE CARD

197—New Payloader Models

Improved performance is offered by the new "HA" and "HAH" Payloader models recently introduced by The Frank G. Hough Co., because of their torque-converter drive, the company states. In addition, the "HAH" model is equipped with power steering. Less gear-shifting, clutching and concentration on the part of the driver are required with the new drive, according to Hough. For more information

CIRCLE 197 ON SERVICE CARD

198—Add Boron

Fertilizer borate at lowest cost per unit is available from Pacific Coast Borax Co. A high grade sodium borate concentrate with about 121 per cent borax equivalent, developed especially for the fertilizer trade, is produced by the company. Available in both fine and coarse mesh. For a bulletin

CIRCLE 198 on SERVICE CARD

199—Cooling Unit

A new book has been produced by Link-Belt on the Roto-Louvre processing machine for drying and/or cooling. This is an economical unit capable of processing large quantities of material with uniform results. Degradation of friable materials is held to a minimum through gentle agitation.

CIRCLE 199 ON SERVICE CARD

200—Pestmaster DDT

Complete information is available on Michigan Chemical's Pestmaster line of DDT products including technical grade, 75 and 50 per cent wettable powder and dust concentrates and 25 per cent emulsion. The latter has low phytotoxic qualities, emulsifies quickly and meets all quality standards. The wettable powders are said to have unique wetting properties.

CIRCLE 200 ON SERVICE CARD

FREE INFORMATION to help you solve fertilizer, pesticide problems

Reader Service

201—Man-Hour Savers

Trojan Loadsters are termed man-hour savers by the manufacturer, Contractors Machinery Co. The model LA-40 handles all types of bulk materials, uses a minimum of working space and has a low load carrying position for stability and speed. Independent bucket action pries loose hard packed materials. Safety of operation is emphasized with reverse curve arms permitting full vision even when raised. For more information

CIRCLE 201 ON SERVICE CARD

202—New Bag Closer

A new model bag closing machine has been introduced by Burroughs Equipment. Weighing only 30 pounds, the unit uses a standard two-thread chain stitch and handles all bags—paper, cloth or burlap. It can be used as a portable or permanently suspended from a pulley and cable rig. For complete details

CIRCLE 202 on SERVICE CARD

How to use the
READER SERVICE CARD

- **Circle number of literature you want.**
- **Print or type your name, position, company and address.**
- **Clip and mail the Service Card.**

203—Iron Chelate

Antcara Chemicals division has introduced Nullapon NaFe-13, a highly concentrated iron chelate especially designed for application in fertilizer mixtures or in other diluted forms for citrus and vegetable crops to correct and/or prevent iron chlorosis. It is a technical sodium ferric ethylene diamine tetraacetate containing 13 per cent minimum of metallic iron. For complete information

CIRCLE 203 ON SERVICE CARD

204—Killing Hoppers

Shell Chemical Corp. has a small booklet designed to assist your aldrin sales promotion plans, which concerns the use of this most effective material in killing grasshoppers. The folder can be used for direct mail or hand-out and describes control methods, time and method of application, the action of aldrin, etc. For a copy

CIRCLE 204 ON SERVICE CARD

205—Mikro Package

The one package Mikro system from Pulverizing Machinery division combines grinding, blending, conveying and dust collection. It provides a completely automatic processing system guaranteeing delivery of material to meet exacting specifications without any loss of material in the process. To obtain descriptive literature

CIRCLE 205 ON SERVICE CARD

206—New Penco Ramps

Penco magnesium ramps now have a new, improved and modernized design. Built for car, truck or yard loading operations, they are equipped with safety side rails and reinforced safety curb ends in various capacities. One man can handle any of them. New literature is available.

CIRCLE 206 ON SERVICE CARD

207—Soluble Plant Food

Concentrated soluble fertilizers seem to be steadily increasing in favor, and Monsanto Chemical high purity phosphates permit closely controlled formulation. Investigate this expanding market through Monsanto's literature.

CIRCLE 207 ON SERVICE CARD

208—Flexible Coating

Carboline Co. has produced a new bulletin describing its B Resin, a flexible Furan coating resistant to corrosive vapors and splash of many chemicals. The bulletin covers application to most surface types, provides explanations of film polymerization, describes general corrosion resistance, features and use.

CIRCLE 208 ON SERVICE CARD

209—McDermott Cooler

Detailed information is available on the compact, high-capacity McDermott Bros. rotary cooler for ammoniated fertilizers. Advantages of use include the reduced reversion in low temperature storage piles, improved condition of mixed goods, less caking and a speed up in curing time. A 6′ x 20′ cooler and dust collector installation can handle 40 tons of fertilizer per hour.

CIRCLE 209 ON SERVICE CARD

210—LiquiJectors

Full information is available on the Dempster Mill Manufacturing Co. line of NH_3 applicators—the LiquiJectors. These units are designed for all needs and are equipped with special spring steel shanks to assure deeper penetration, more even travel and less damage from underground obstructions.

CIRCLE 210 ON SERVICE CARD

211—Storage Systems

Marietta storage systems will help eliminate waste and spoilage while improving handling facilities. Information is available on these modern, efficient structures which have been designed to lower operating costs in the handling of any bulk material.

CIRCLE 211 ON SERVICE CARD

212—Sinox Herbicides

Standard Agricultural Chemicals says that you can increase sales by stocking the Sinox line of weed killers. Prices, marketing agreement and other information on these dinitro herbicides are available.

CIRCLE 212 ON SERVICE CARD

213—Weatherhead Equipment

Details and prices can be obtained from the Weatherhead Co. on its NH_3 valves, fittings and hose assemblies. The company offers a new two-seat vapor relief valve which eliminates downtime and is said to fit under any tank cover.

CIRCLE 213 ON SERVICE CARD

214—TractoLoader

Bulk material handling costs can be cut with a TL-10 TractoLoader according to Tractomotive Corp., the manufacturer. A hydraulic torque converter drive speeds loading, enables the operator to crowd steadily into the pile using only foot throttle and bucket control levers. A clutch-type transmission eliminates most shifting on the highly maneuverable unit. For more information

CIRCLE 214 ON SERVICE CARD

215—For Copper Sulfate

Republic Chemical Corp. is producing 1924 brand copper sulfate at its Curtis Bay, Md., plant. If you are looking for a dependable source of this fungicide

CIRCLE 215 ON SERVICE CARD

216—Anti-Caking Agent

Johns Manville Celite, anti-caking agent for free-flowing fertilizers, has high absorption and a unique diatom structure which makes the material a very effective safeguard against caking. Celite adds bulk, providing better suspension, greater absorption and improved dispersion. For more information

CIRCLE 216 ON SERVICE CARD

217—NH_3 Application

John Blue Co. offers complete information on its wide variety of NH_3 equipment. The line features tractor and trailer mounted applicators for every use including high clearance models for late side dressing and a variety of coulters, sealer-attachments, pumps, special applicators, etc. The company states that more than 50 per cent of NH_3 application equipment depends on its metering units.

CIRCLE 217 ON SERVICE CARD

How to use the
READER SERVICE CARD

- **Circle number of literature you want.**
- **Print or type your name, position, company and address.**
- **Clip and mail the Service Card.**

218—Eston Fumigants

Eston Chemicals division has issued a new catalog on methyl bromide fumigant designed to inform readers on new uses found in recent years. Also included is data on the new M-B-C fumigant, a methyl bromide-chloropicrin combination for specified uses such as in flour mills and grain storage facilities.

CIRCLE 218 ON SERVICE CARD

219—Fertilizer Buckets

A bulletin on Blaw-Knox two to four line Lever Arm Buckets tells how tight-lip construction of the chemical and fertilizer buckets prevents costly contamination through leakage of granular fines. A wide range of models permits selection of proper size, weight and type for any requirements.

CIRCLE 219 ON SERVICE CARD

220—Better Profits

International Paper Co. would like to show you how Bagpak multiwalls can provide you with a better profit picture through constant, perfect protection against loss and contamination in transit and storage. Five basic types are available.

CIRCLE 220 ON SERVICE CARD

221—Calmonite

H. J. Baker & Co. is sole distributor for the German producer of Calmonite, ammonium nitrate limestone. The material contains a total of 20.5 per cent nitrogen in both nitrate and ammonia form, and in addition has 35–40 per cent calcium carbonate. It is produced in green pellets and is available bagged f.o.b. Atlantic and Gulf ports. For a sample and additional information

CIRCLE 221 ON SERVICE CARD

222—Neutronyx 600

Onyx Oil Chemical Co. is now offering Neutronyx 600, a non-ionic material that serves equally well as an emulsifier, dispersing agent, detergent and wetting agent. It is superior as an emulsifier in chlordane and DDT and is compatible with acids, alkalies, electrolytes, hard water and anionic and cationic surfactants. For more data

CIRCLE 222 ON SERVICE CARD

223—Rego Controls

Bastian Blessing Co. has a new line of Rego NH_3 controls, described as one of the most complete available. This is an entirely new series of globe and angle valves, a new multivalve, relief units and other items. If interested in more details

CIRCLE 223 ON SERVICE CARD

224—Analytical Services

A new, illustrated booklet describes the analytical services of Foster D. Snell, Inc., consulting chemists and engineers. Described are analysis of drugs and pharmaceuticals, shipment samples, materials according to specification, samples involved in litigation and foods for detection of harmful contaminants.

CIRCLE 224 ON SERVICE CARD

225—Endrin Formulations

Shell Chemical Corp. suggests that you plan to formulate endrin dusts and sprays for control of tobacco hornworms and other pests such as budworms, flea beetles and grasshoppers. Used as directed for control of hornworms, endrin does not affect tobacco flavor. For details

CIRCLE 225 ON SERVICE CARD

226—Urea Process

The Pechiney process for urea production is the lowest cost, minimum corrosion process for manufacture of high purity material available, according to Foster-Wheeler, exclusive licensor in the U. S. It features a neutral oil circulating medium for re-cycl ng of unconverted ammonia-carbon dioxide. A bulletin is available.

CIRCLE 226 ON SERVICE CARD

227—Storage Tanks

Birmingham Tank Co. has information on anhydrous ammonia and LP gas storage tanks. They are available for immediate shipment in both 18,000 and 30,000 gallon capacities.

CIRCLE 227 ON SERVICE CARD

Buyers' Guide

Classified Index to Advertisers in 'Farm Chemicals'

ALDRIN
Ashcraft-Wilkinson Co., Atlanta, Ga.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.
Shell Chemical Co., Agr. Chem. Div., Denver, Colo.

AMMONIA—Anhydrous and Liquor
Commercial Solvents Corporation, New York City
Grand River Chem. Div., Deere & Co., Tulsa, Okla.
Lion Oil Co., El Dorado, Ark.
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
Phillips Chemical Co., Bartlesville, Okla.
Spencer Chemical Co., Kansas City, Mo.

AMMONIUM NITRATE
Ashcraft-Wilkinson Co., Atlanta, Ga.
Commercial Solvents Corporation, New York City
Lion Oil Co., El Dorado, Ark.
Phillips Chemical Co., Bartlesville, Okla.
Spencer Chemical Co., Kansas City, Mo.

AMMONIUM PHOSPHATE
Monsanto Chem. Co., St. Louis, Mo.

AMMONIUM SULFATE
See Sulfate of Ammonia

AMMONIUM SULFATE NITRATE
Baker & Bro., H. J., New York City

BAGS—Multiwall-Paper
International Paper Co., Bagpak Div., N. Y. C.
Hammond Bag & Paper Co., Wellsburg, W. Va.
Hudson Pulp & Paper Corp., N. Y. C.
Kraft Bag Corporation, New York City
Union Bag & Paper Corp., New York City

BAGS—Dealers and Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.

BAG CLOSING MACHINES
Fischbein Co., Dave, Minneapolis, Minn.
International Paper Co., Bagpak Div., N. Y. C.

BAG PRINTING MACHINES
Schmutz Mfg., Louisville, Ky.

BAG FILLING MACHINES
Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

BHC AND LINDANE
Ashcraft-Wilkinson Co., Atlanta, Ga.,
Diamond Alkali Co., Newark, N. J.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.

BONE PRODUCTS
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

BORAX AND BORIC ACID
Woodward & Dickerson, Inc., Philadelphia, Pa.

BROKERS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Keim, Samuel D., Philadelphia, Pa.
Woodward & Dickerson, Inc., Philadelphia, Pa.

BUCKETS—Hoist, Crane, etc.
Hayward Company, The, New York City

CALCIUM ARSENATE
American Agricultural Chemical Co., N. Y. C.

CARS AND CART
Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

CASTOR POMACE
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City

CHEMISTS AND ASSAYERS
Shuey & Co., Inc., Savannah, Ga.
Wiley & Company, Baltimore, Md.

CHLORDANE
Ashcraft-Wilkinson Co., Atlanta, Ga.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.

CLAY
Ashcraft-Wilkinson Co., Atlanta, Ga.

CONDITIONERS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Jackle, Frank R., New York City
Keim, Samuel D., Philadelphia, Pa.
National Lime & Stone Co., Findlay, Ohio

CONVEYORS
Power-Curve Conveyor Co., Denver, Colo.
Link-Belt Co., Chicago, Ill.

COPPER SULFATE
Tennessee Corp., Atlanta, Ga.

COTTONSEED PRODUCTS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa

DDT
Ashcraft-Wilkinson Co., Atlanta, Ga.
Diamond Alkali Co., Newark, N. J.
Monsanto Chemical Co., St. Louis, Mo.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.

DIELDRIN
Ashcraft-Wilkinson Co., Atlanta, Ga.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.
Shell Chem. Corp., Agr. Chem. Div., Denver, Colo.

DILUENTS
Ashcraft-Wilkinson Co., Atlanta, Ga.
Calcium Carbonate Co., Chicago, Ill.
Pioneer Pyrophyllite Producers, Beverly Hills, Calif.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.
Summit Mining Corporation, Carlisle, Pa.
Thomas Alabama Kaolin Co., Baltimore, Md.

DITHIOCARBAMATES
Berkshire Chemicals, New York City

ELEVATORS
Power-Curve Conveyor Co., Denver, Colo.
Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.

ENGINEERS—Chemical and Industrial
Chemical Construction Corp., New York City
Fairlie, Inc., Andrew M., New York City
General Industrial Development Corp., N. Y. C.
Marietta Concrete Corporation, Marietta, Ohio
Stedman Foundry and Machine Co., Aurora, Ind.
Titlestad Corporation, Nicolay, New York City

FERTILIZER—Mixed
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Davison Chemical Co., div. of W. R. Grace & Co., Baltimore, Md
International Min. & Chem. Corp., Chicago, Ill.

FILLERS
Bradley & Baker, N. Y. C.

FISH SCRAP AND OIL
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

FULLER'S EARTH
Ashcraft-Wilkinson Co., Atlanta, Ga.

FUNGICIDES
American Agricultural Chemical Co., N. Y. C.
Berkshire Chemicals, New York City
Pittsburgh Coke & Chemical Co., Agr. Chem. Div., Pittsburgh, Pa.
Tennessee Corp., Atlanta, Ga.

HERBICIDES
Diamond Alkali Co., Newark, N. J.
Lion Oil Company, El Dorado, Ark.
Monsanto Chemical Co., St. Louis, Mo.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.

HERBICIDES—Oils
Lion Oil Company, El Dorado, Ark.

HOPPERS & SPOUTS
Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

IMPORTERS, EXPORTERS
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Berkshire Chemicals, New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

INSECTICIDES
American Agricultural Chemical Co., N. Y. C.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Berkshire Chemicals, New York City
Diamond Alkali Co., Newark, N. J.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div. Pittsburgh, Pa.
Shell Chem. Corp., Agr. Chem. Div., Denver, Colo.
U. S. Industrial Chemicals Co., New York City

IRON SULFATE
Tennessee Corp., Atlanta, Ga.

KAOLIN
Thomas Alabama Kaolin Co., Baltimore, Md.

LEAD ARSENATE
American Agricultural Chemical Co., N. Y. C.

LIMESTONE
American Agricultural Chemical Co., N. Y. C.
Ashcraft-Wilkinson Co., Atlanta, Ga.
National Lime & Stone Co., Findlay, Ohio

Buyers' Guide

MACHINERY—Acid Making and Handling
Atlanta Utility Works, The, East Point, Ga.
Chemical Construction Corp., New York City
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Acidulating
Chemical Construction Corp., New York City

MACHINERY—Grinding and Pulverizing
Atlanta Utility Works, The, East Point, Ga.
Bradley Pulverizer Co., Allentown, Pa.
Poulsen Co., Los Angeles, Calif.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Material Handling
Atlanta Utility Works, The, East Point, Ga.
Clark Equipt. Co., Construction Mach. Div., Benton Harbor, Mich.
Hayward Company, The, New York City
Hough, The Frank G. Co., Libertyville, Ill.
Lessman Mfg. Co., Des Moines, Ia.
Link-Belt Co., Chicago, Ill.
Poulsen Co., Los Angeles. Calif.
Power-Curve Conveyor Co., Denver, Colo.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Mixing, Screening and Bagging
Atlanta Utility Works, The, East Point, Ga.
Poulsen Co., Los Angeles, Calif.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY—Power Transmission
Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.

MACHINERY
Superphosphate Manufacturing
Atlanta Utility Works, The, East Point, Ga.
Link-Belt Co., Chicago, Ill.
Stedman Foundry and Machine Co., Aurora, Ind.

MAGNESIUM SULFATE
Berkshire Chemicals, New York City

MANGANESE SULFATE
Tennessee Corp., Atlanta, Ga.

MANURE SALTS
Potash Co. of America, Washington, D. C.

MINOR ELEMENTS
Tennessee Corporation, Atlanta, Ga.

MIXERS
Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

NITRATE OF POTASH
Berkshire Chemicals, New York City

NITRATE OF SODA
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
International Min. & Chem. Corp., Chicago, Ill.
Woodward & Dickerson, Inc., Philadelphia, Pa.

NITROGEN SOLUTIONS
Commercial Solvents Corporation, New York City
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
Lion Oil Company, El Dorado, Ark.
Phillips Chemical Co., Bartlesville, Okla.
Spencer Chemical Co., Kansas City, Mo.

NITROGEN MATERIALS—Organic
American Agricultual Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

NOZZLES—Spray
Monarch Mfg. Works, Philadelphia, Pa.
Spraying Systems Co., Bellwood, Ill.

PARATHION
Ashcraft-Wilkinson Co., Atlanta, Ga.
Monsanto Chemical Co., St. Louis, Mo.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.

PENTACHLOROPHENOL
Monsanto Chemical Co., St. Louis, Mo.

PHOSPHATE ROCK
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
Woodward & Dickerson, Inc., Philadelphia, Pa.

PHOSPHORIC ACID
American Agricultural Chemical Co., N. Y. C.
Monsanto Chemical Co., St. Louis, Mo.

PLANT CONSTRUCTION—Fertilizer and Acid
Atlanta Utility Works, The, East Point, Ga.
Chemical Construction Corp., New York City
General Industrial Development Corp., N. Y. C.
Link-Belt Co., Chicago, Ill.
Monsanto Chemical Co., St. Louis, Mo.
Stedman Foundry and Machine Co., Aurora, Ind.
Titlestad Corporation Nicolay, New York City

POTASH—Muriate
American Potash & Chemical Corp., N. Y. C.
Ashcraft-Wilkinson Co., (Duval Potash) Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
Duval Sulphur & Potash Co., Houston, Tex.
International Min. & Chem. Corp., Chicago, Ill.
Potash Co. of America, Washington, D. C.
Southwest Potash Corporation, New York City
United States Potash Co., N. Y. C.

POTASH—Sulfate
American Potash & Chemical Corp., N. Y. C.
Baker & Bro., H. J., New York City
International Min. & Chem. Corp., Chicago, Ill.
Potash Co. of America, Washington, D. C.

POTASSIUM PHOSPHATE
Monsanto Chemical Co., St. Louis, Mo.

PRINTING PRESSES—Bag
Schmutz Mfg. Co., Louisville, Ky.

PYROPHYLLITE
Ashcraft-Wilkinson Co., Atlanta, Ga.
Pioneer Pyrophyllite Producers, Beverly Hills, Calif.

REPAIR PARTS AND CASTINGS
Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

SCALES—Including Automatic Baggers
Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

SCREENS
Atlanta Utility Works, The, East Point, Ga.
Stedman Foundry and Machine Co., Aurora, Ind.

SPRAYS
Monarch Mfg. Works, Inc., Philadelphia, Pa.
Spraying Systems Co., Bellwood, Ill.

STORAGE BUILDINGS
Butler Manufacturing Co., Kansas City, Mo.
Marietta Concrete Corporation, Marietta, Ohio

SULFATE OF AMMONIA
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
Jackle, Frank R., New York City
Lion Oil Co., El Dorado, Ark.
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C.
Phillips Chemical Co., Bartlesville, Okla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

SULFATE OF POTASH—MAGNESIA
International Min. & Chem. Corp., Chicago, Ill.

SULFUR
Ashcraft-Wilkinson Co., Atlanta, Ga.
Texas Gulf Sulphur Co., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

SULFUR—Dusting & Spraying
Ashcraft-Wilkinson Co., Atlanta, Ga.
U. S. Phosphoric Products Div., Tennessee Corp., Tampa, Fla.

SULFURIC ACID
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
Lion Oil Company, El Dorado, Ark.
Monsanto Chemical Co., St. Louis, Mo.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.

SUPERPHOSPHATE
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
Davison Chemical Co., div. of W. R. Grace & Co., Baltimore, Md.
International Min. & Chem. Corp., Chicago, Ill.
Jackle, Frank R., New York City
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

SUPERPHOSPHATE—Concentrated
Armour Fertilizer Works, Atlanta, Ga.
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
U. S. Phosphoric Products Division, Tennessee Corp., Tampa, Fla.
Woodward & Dickerson, Inc., Philadelphia, Pa.

TALC
Ashcraft-Wilkinson Co., Atlanta, Ga.

TANKAGE
American Agricultural Chemical Co., N. Y. C.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Bradley & Baker, N. Y. C.
International Min. & Chem. Corp., Chicago, Ill.
Jackle, Frank R., New York City
Woodward & Dickerson, Inc., Philadelphia, Pa.

TANKS—NH3
Birmingham Tank Co., Birmingham, Ala.

TEPP
Monsanto Chemical Co., St. Louis, Mo.

TOXAPHENE
Ashcraft-Wilkinson Co., Atlanta, Ga.
Pittsburgh Coke & Chem. Co., Agr., Chem. Div., Pittsburgh, Pa.

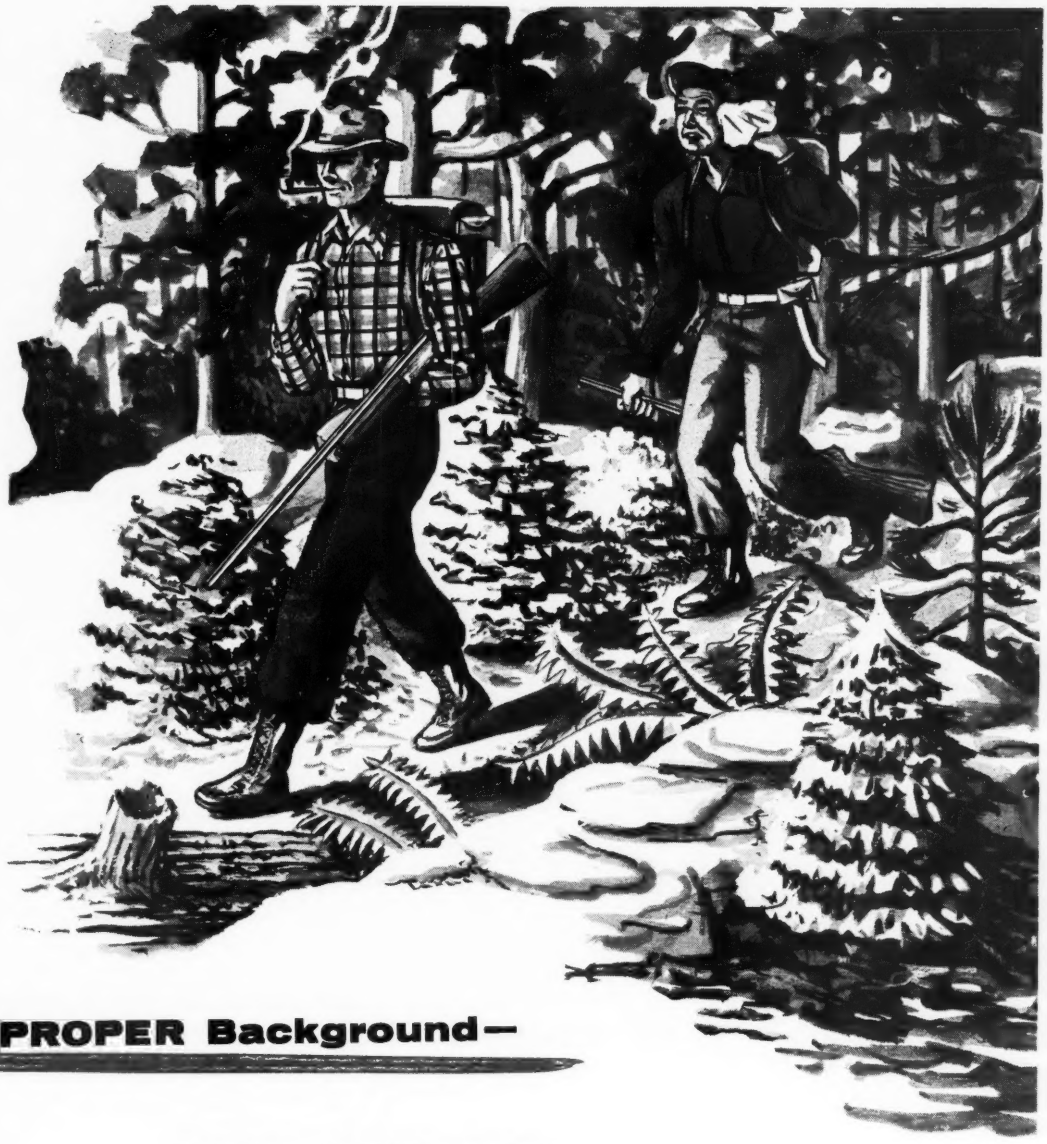
2, 4-D
Diamond Alkali Co., Newark, N. J.
Monsanto Chemical Co., St. Louis, Mo.
Pittsburgh Coke & Chem. Co., Agr. Chem Div., Pittsburgh, Pa.

2, 4, 5-T
Diamond Alkali Co., Newark, N. J.
Monsanto Chemical Co., St. Louis, Mo.
Pittsburgh Coke & Chem. Co., Agr. Chem. Div., Pittsburgh, Pa.

UREA & UREA PRODUCTS
Baker & Bro., H. J., New York City
Bradley & Baker, N. Y. C.
Grand River Chem. Div., Deere & Co., Tulsa, Okla.
Nitrogen Div., Allied Chemical & Dye Corp., N.Y.C

VALVES
Atlanta Utility Works, The, East Point, Ga.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

ZINC SULFATE
Tennessee Corp., Atlanta, Ga.



The PROPER Background—

Just as the special aptitude of the guide
can get you "out of the woods," so can the years of experience and
research of the Tennessee Corporation in the fertilizer field
keep you a step ahead in progress. As chemists, as well as
experienced producers, we alone have explored the use of
SUL-FON-ATES in fertilizer manufacture, from a technical angle.
We will gladly lend this technical skill to assist you in conducting
controlled plant tests. Let us send an experienced technician
to work with you in your plant, now, to demonstrate the
proper use of Tennessee's SUL-FON-ATE in your curing process
and point out how speedily and economically it works.

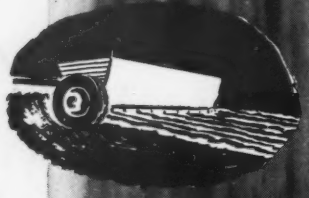
ORGANIC CHEMICALS DIVISION

TENNESSEE TC TENNESSEE CORPORATION CORPORATION

617-29 Grant Building, Atlanta, Georgia

DAVISON

1. STORAGE CONTROL—will not cake or lump while in storage.



2. APPLICATION CONTROL—drills free and even . . . does not bridge over in the drill.

3. FOOD CONTROL—supplies uniform amount of plant food at desirable rates.

Davison's Granulated Superphosphate with 3-way control can mean added sales for you!

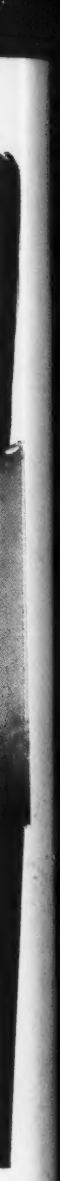
No longer is it necessary for you or the farmer to worry about lumping or caking . . . Davison's Granulated Superphosphate will store without becoming hard or caked. And when the farmer starts to apply Granulated Superphosphate in the field he will find there is no dusting nor will it bridge over in the drill. Granulated Superphosphate drills freely and evenly giving complete coverage. Because of the granular structure, plant food is released at desirable rates.

For added sales points be sure to get *Davison's Granulated Superphosphate with the 3-way control!*

Progress through Chemistry

DAVISON CHEMICAL COMPANY

Division of W. R. Grace & Co.

BALTIMORE 3, MARYLAND

Producers of Catalysts, Inorganic Acids, Superphosphates, Triple Superphosphates, Phosphate Rock, Silica Gels and Silicofluorides. Sole Producers of DAVCO® Granulated Fertilizers.